the signal and the noise

信号与噪声

[美] 纳特·西尔弗（Nate Silver）◎著　胡晓姣　张　新　朱辰辰◎译

why so many predictions fail— but some don't

中信出版社·CHINACITICPRESS

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The Signal and the Noise

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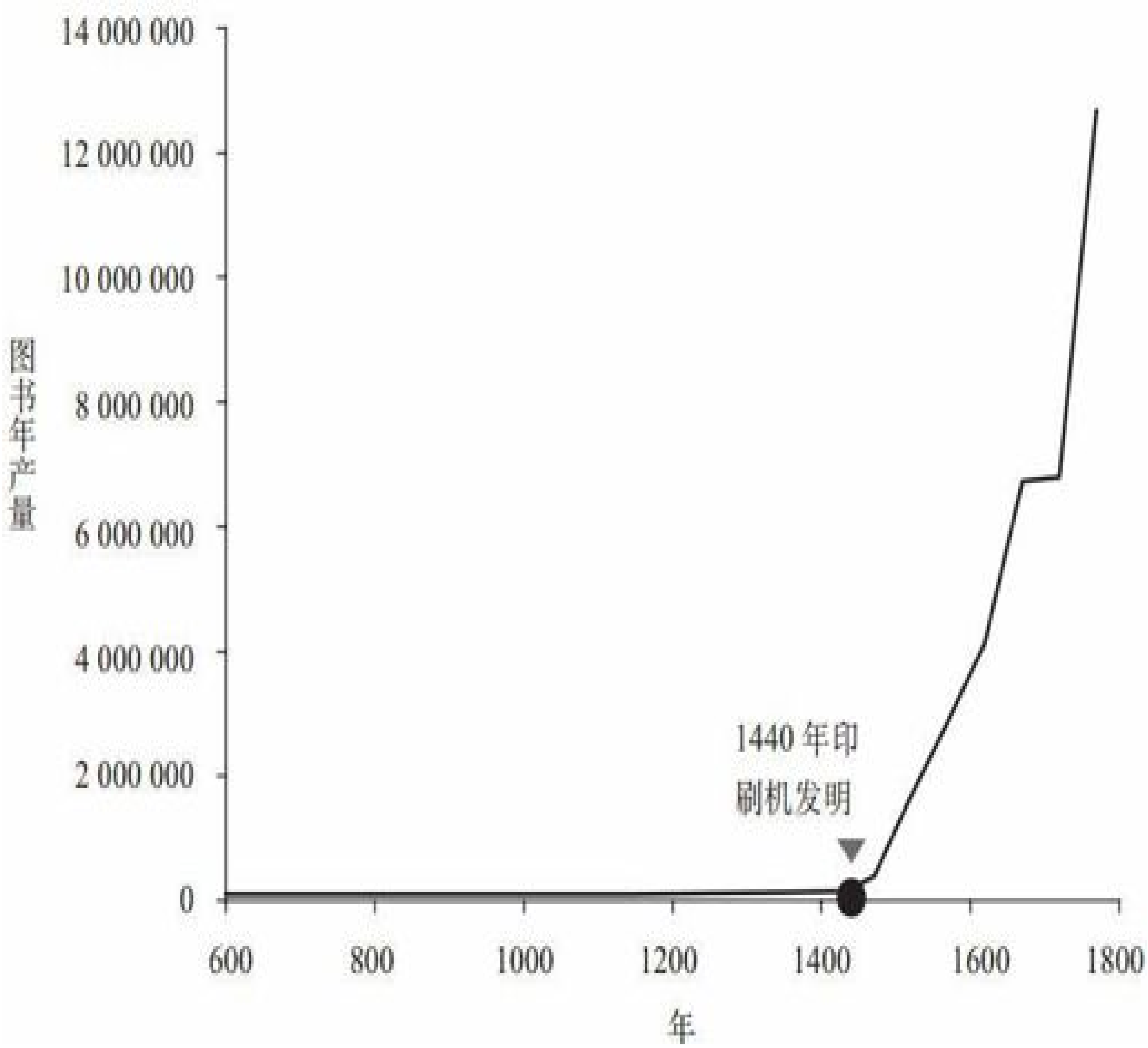
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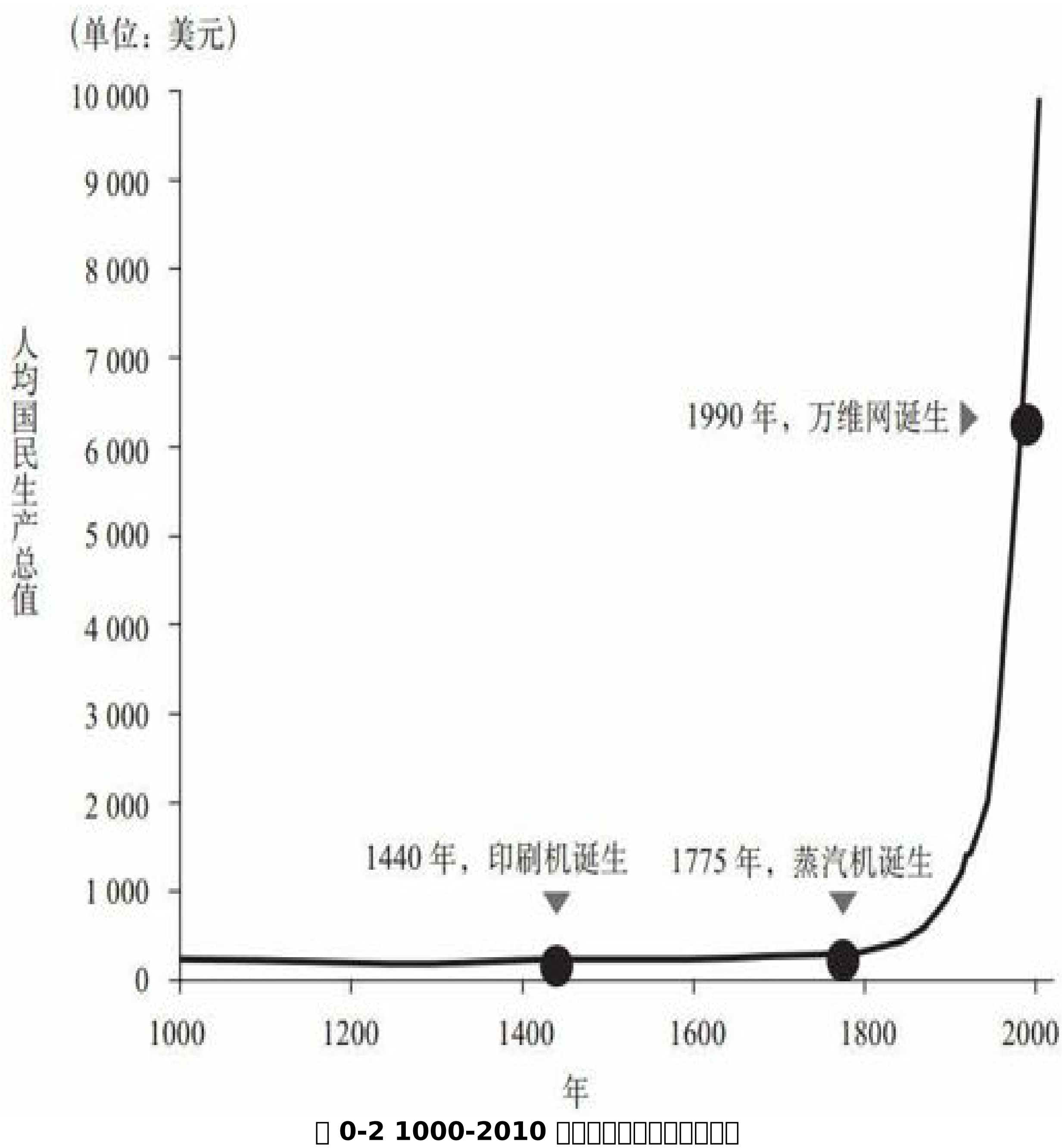
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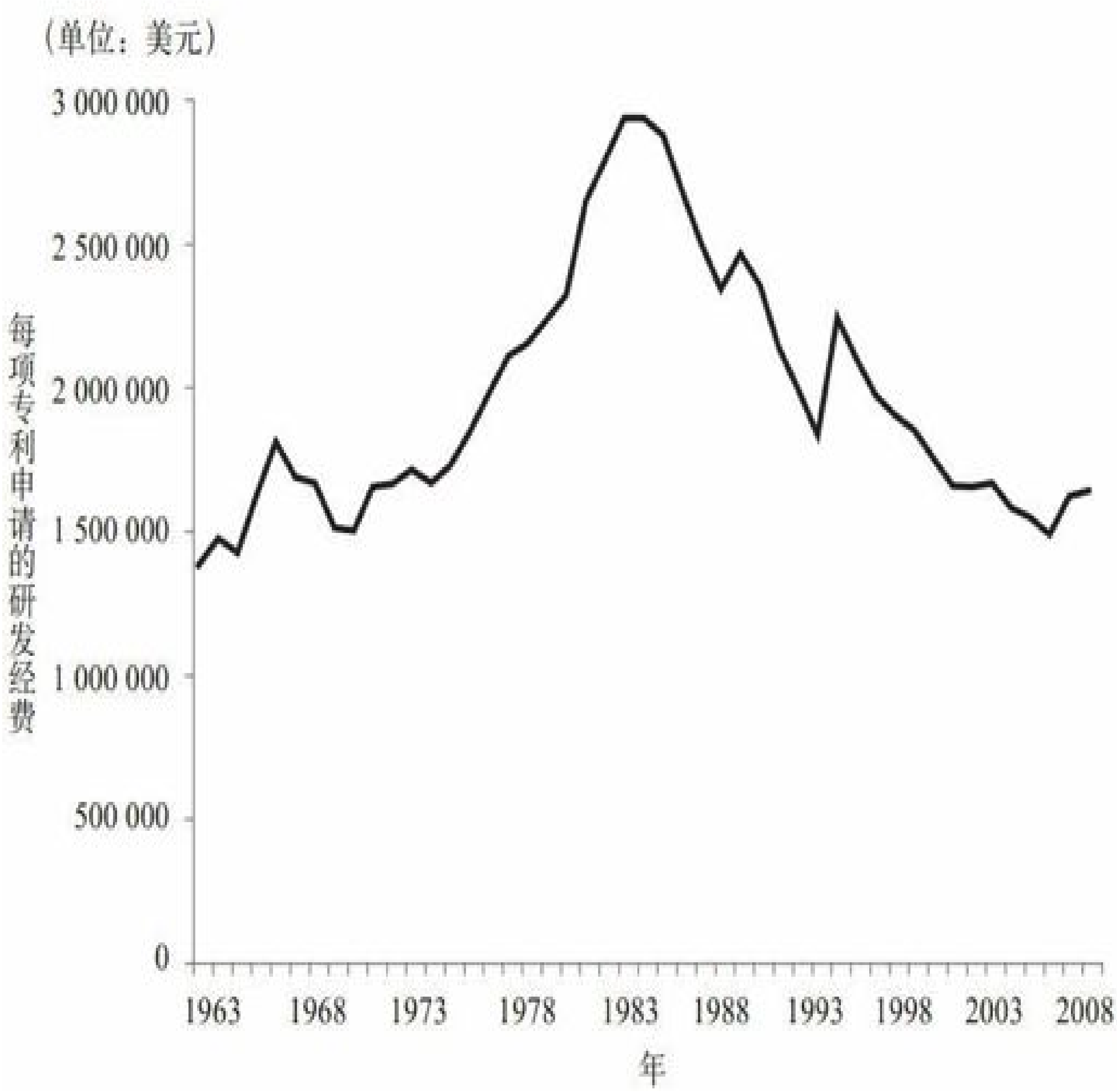
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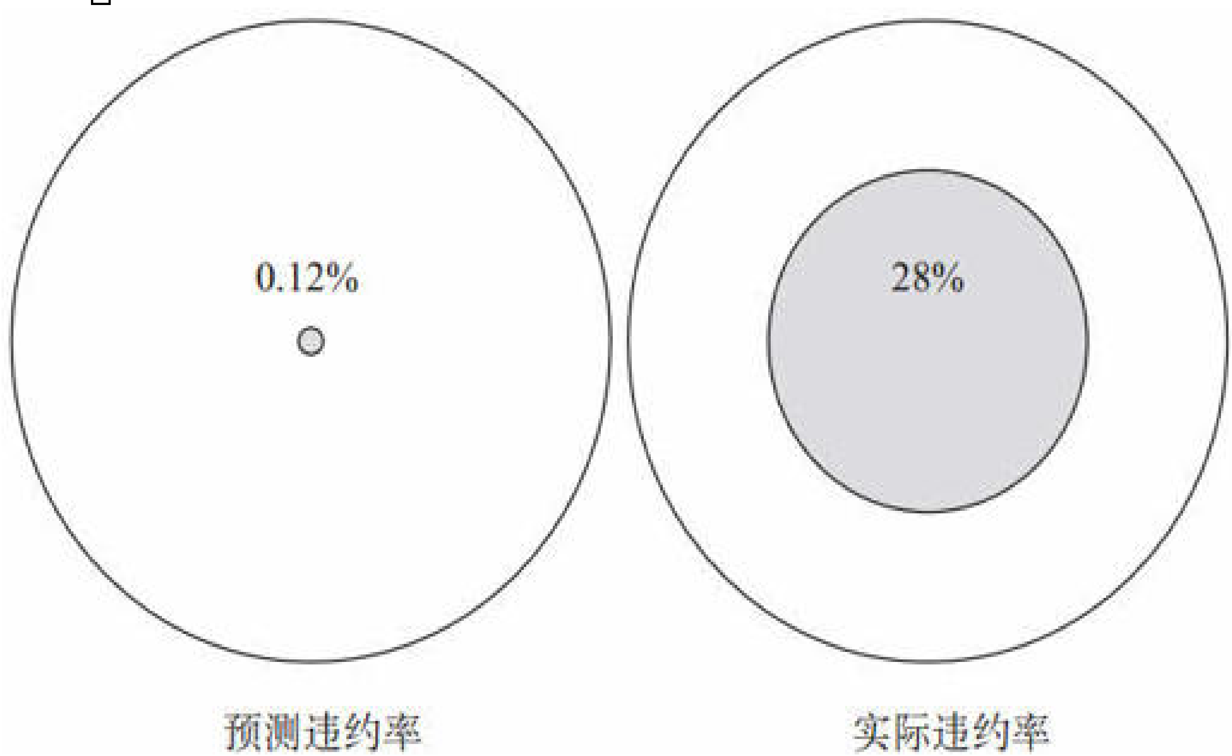
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0.12%
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预测违约率
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[illegible]·[illegible]——“[illegible]”[illegible] 2009 [illegible] 2011 [illegible]——[illegible]

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[illegible] 100% [illegible] 1 000% [illegible]

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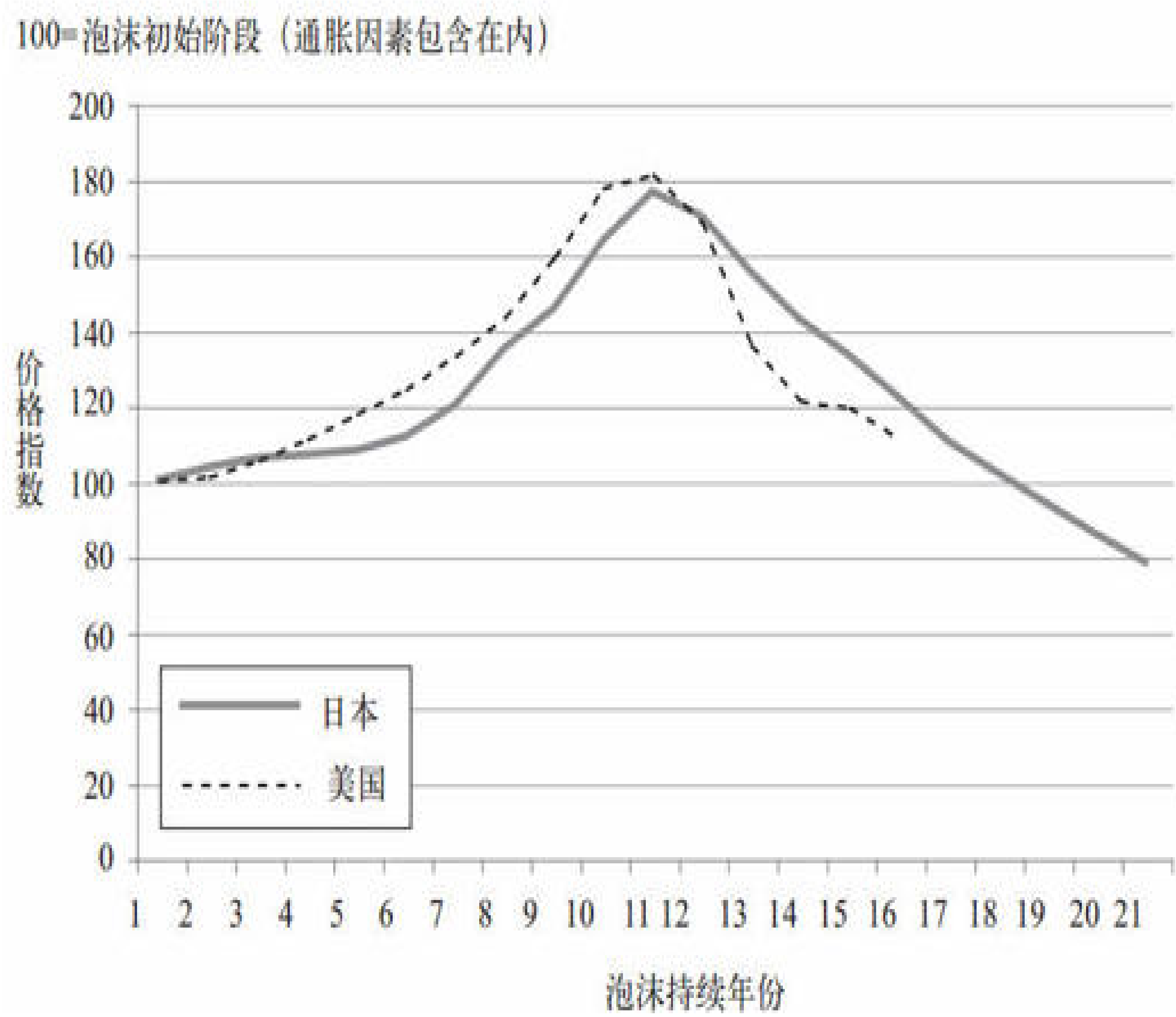
20 □□ 50 □□□□□□□ 21 □□□□□□□□□□□□□□□□□□□□□□□□□□ 21 □□□□□□□□□□

□□1940~1960 □□ 20 □□□□□□□□□ 44%□□□ 62%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□10 □ 20%□□□□,□□□□□ 21 □□□□□□□□□□□□□□□□□□□□□□10 □□□□ 80%□□□□□□□□□□□□□□□□□□□

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□□21 □□□□□□□□□□□□□□□□□□□□□□□□□ 1%□□

□□20 □□ 90 □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1981~1991 □□ 10 □□□□□□□□□□□□□ 76%□□□□□ 5 □□□□ 31%□□□□□□□□□□□□□□□□□□□ 1–3□□



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[illegible] 20 [illegible]

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[illegible] 30%[illegible] 2007 [illegible]



美国房屋销售总量
美国抵押贷款支持证券总量
40 万亿
60 万亿
80 万亿
(单位：美元)
2.3 万亿
2005
2.1 万亿
2006
1.7 万亿
2007
1.3 万亿
2008
1.2 万亿
2009

[illegible]——[illegible] 20%[illegible]2008 [illegible]
9 [illegible] 14 [illegible]

[illegible]

[illegible]

[illegible]·[illegible] 500 [illegible]

[illegible]

2009 [illegible] 12 [illegible]·[illegible]

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[illegible]
38 [illegible]

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[illegible] 25 [illegible] 46 000 [illegible]——[illegible]
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[illegible] 400 000 [illegible] 350 000 [illegible]“[illegible]”[illegible]

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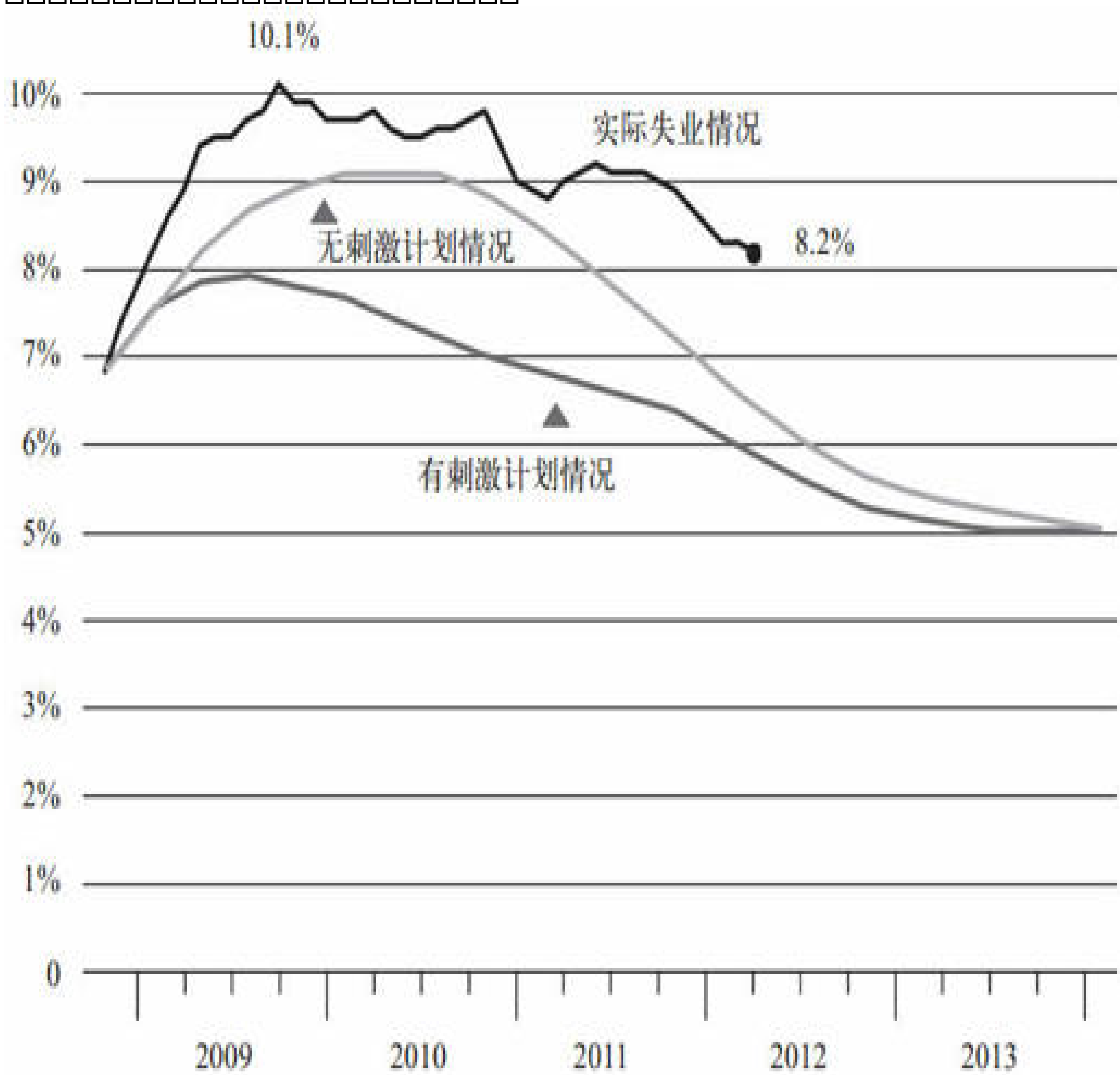
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2009 [illegible] 2 [illegible] 2009 [illegible] 7 [illegible] 9.5%[illegible] 10 [illegible] 10.1%[illegible]“[illegible]”[illegible]



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[illegible]·[illegible]“[illegible]

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[illegible] 2%[illegible] 8%[illegible] 6%[illegible]

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[illegible]

[illegible] 4 [illegible]

- [illegible]
- [illegible]
- [illegible] 1 [illegible] 50 [illegible]
- [illegible]

[illegible]

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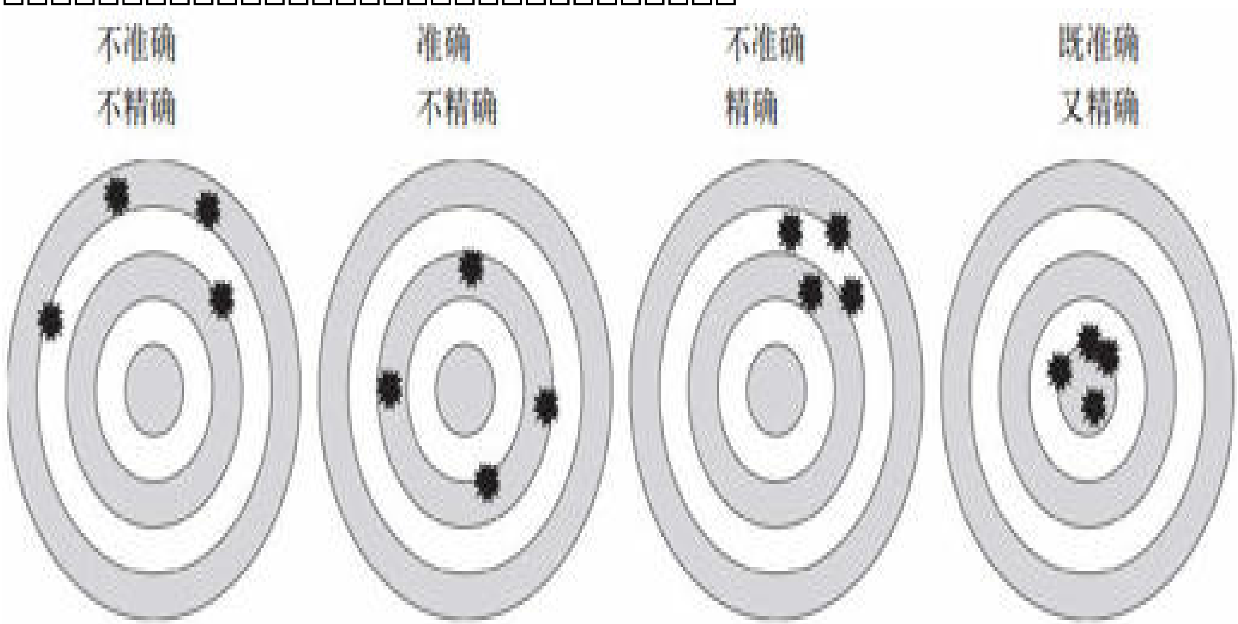
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“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible] 2008 [illegible]

[illegible]2008 [illegible] 9 [illegible] 15 [illegible] 20 [illegible] 30 [illegible]“[illegible]”[illegible] 95%[illegible] 7:1[illegible]

[illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]·[illegible] 0.5 [illegible]·[illegible]

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[illegible]“[illegible]”[illegible]

[illegible] 1/4 [illegible] 5 [illegible]

[illegible] 338 [illegible] 338 [illegible]

[illegible] 2–1“[illegible]”[illegible]

[illegible]	285	39%
[illegible]	53	7%
[illegible]	57	8%
[illegible]	70	10%
[illegible]	268	37%
[illegible]	733	100%
[illegible]	249	

[illegible] 2008 [illegible] 3 [illegible]——[illegible]·[illegible]——[illegible] 49%~52%[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

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1987 [illegible] 6 [illegible] 12 [illegible]

1988 [illegible] 11 [illegible] 16 [illegible] 3 [illegible]

[illegible]——[illegible] 20 [illegible]——[illegible]

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[illegible]1990 [illegible]——[illegible]——[illegible] 1/2[illegible] 1 [illegible] 5%[illegible]

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[illegible] 20 [illegible]“[illegible]”[illegible] 15 [illegible] 2005 [illegible]

[illegible]——[illegible]——[illegible] 15%[illegible] 25%[illegible]

[illegible]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]·[illegible]——[illegible]“[illegible]”[illegible]

[illegible]

> [illegible] A [illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]

> [illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]

[illegible] 2-2 [illegible]

[illegible]	[illegible]	
“[illegible]”[illegible]	“[illegible]”[illegible]“[illegible]”[illegible]	
[illegible]	[illegible]“[illegible]”[illegible]	

[illegible]	[illegible] ——[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
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[illegible]	[illegible]

[illegible]

[illegible]

[illegible]“[illegible]”

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[illegible]——[illegible] 4 [illegible]·[illegible]2010 [illegible] 11 [illegible] 63 [illegible] 100 [illegible]

[illegible]——[illegible]

[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

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[illegible]“[illegible]”[illegible]

[illegible]

[illegible] 180 [illegible]——[illegible]——[illegible]

2010 [illegible] 47 [illegible] 53 [illegible] 435 [illegible]

[illegible] 11 [illegible]

[illegible] 11 [illegible] 6 [illegible]——[illegible] 11 [illegible] 3 [illegible]

[illegible]

[illegible] 435 [illegible]

[illegible] 10 [illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]·[illegible]·[illegible]·[illegible]·[illegible] 2008 [illegible] 2012 [illegible]·[illegible]·[illegible]

[illegible]

[illegible]

2008 [illegible] 2 [illegible] 538 [illegible]——[illegible]——[illegible]

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[illegible]

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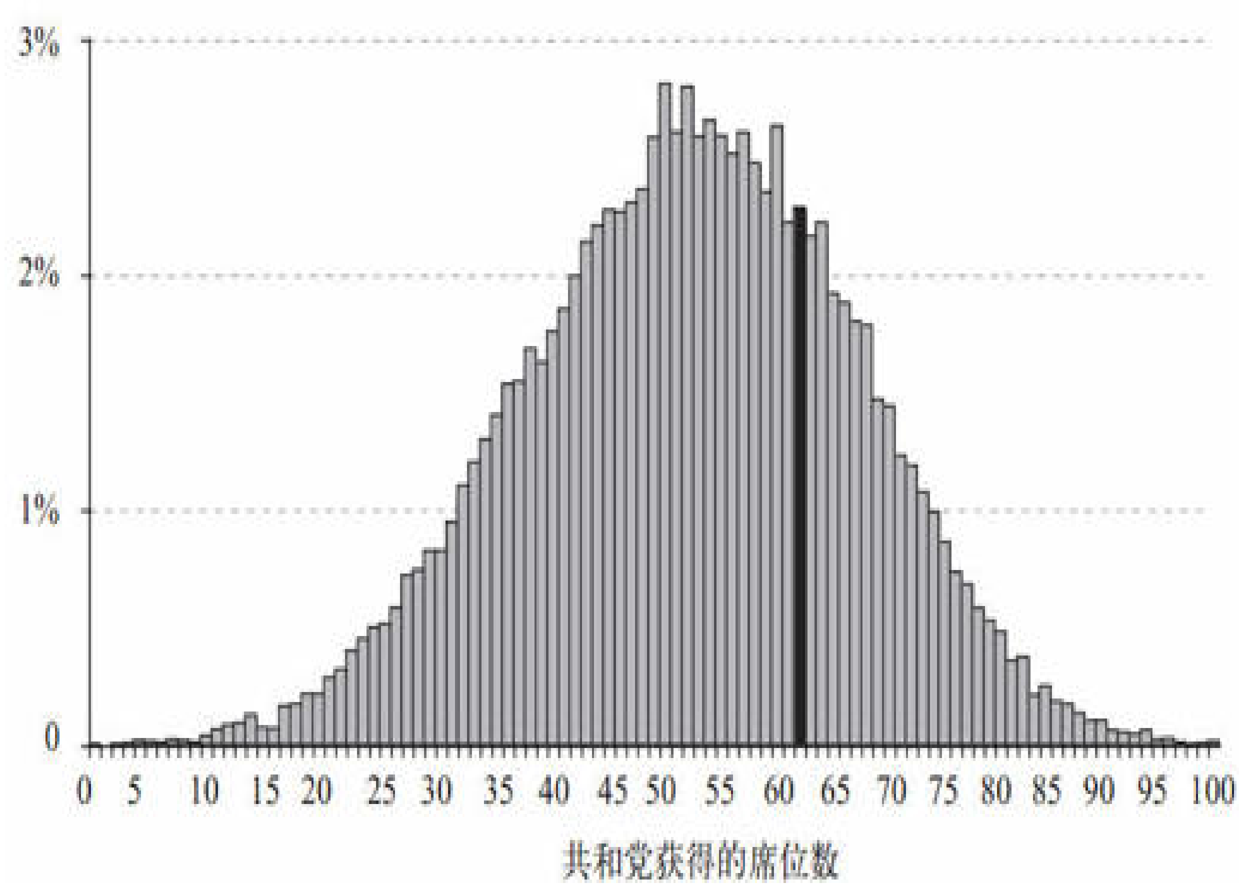
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[illegible] 2–1 2010 [illegible] 11 [illegible] 2 [illegible]538 [illegible]

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[illegible] 435 [illegible] 77 [illegible]

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[illegible]2008 [illegible] 8 [illegible] 2012 [illegible]

[illegible] 2–3 [illegible] 538 [illegible] 1998~2008 [illegible] 5 [illegible] 95%[illegible]“[illegible]”[illegible] 5 [illegible] 59%[illegible]

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[illegible]				
[illegible]	[illegible]	[illegible] 5 [illegible]	[illegible] 10 [illegible]	[illegible] 20 [illegible]
[illegible]	64%	95%	99.7%	99.999%
[illegible]	60%	89%	98%	99.97%
[illegible]	57%	81%	95%	99.7%
[illegible]	55%	72%	87%	98%
[illegible]	53%	66%	79%	93%
[illegible]	52%	59%	67%	81%

[illegible]538 [illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]2011 [illegible] 99.7%[illegible]

[illegible]2010 [illegible] 100%[illegible] 100%[illegible] 99%[illegible]99.99%[illegible] 99.999 9%[illegible] 1%[illegible]

[illegible] 90%[illegible]
10%[illegible]

[illegible] 90%[illegible]·[illegible]·[illegible]
90%[illegible]99%[illegible] 99.999 9%[illegible] 3 [illegible] 3 [illegible]

[illegible]

[illegible]

[illegible]——[illegible]2012 [illegible]

[illegible]——[illegible]——[illegible]2008 [illegible] 538 [illegible] 538 [illegible]

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[illegible]

[illegible]——[illegible]

[illegible]·[illegible]

[illegible]——[illegible]——[illegible]——[illegible]

[illegible] 15%~20%[illegible]

[illegible]“[illegible]”[illegible]——[illegible]——[illegible] 538 [illegible]

2000 [illegible]·[illegible]([illegible])[illegible]·[illegible]·D·[illegible]“[illegible]”[illegible]

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[illegible]“[illegible]”[illegible]2000 [illegible] 19 [illegible]

[illegible] 1988 [illegible]——[illegible]——[illegible]·[illegible]

[illegible]1992 [illegible] 5 [illegible]“[illegible]”[illegible]——[illegible]——[illegible] 7%[illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]——[illegible]——[illegible]

[illegible]“[illegible]”[illegible]·[illegible] 1984 [illegible]

[illegible] 435 [illegible] 35 [illegible]

[illegible] 538 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”7 [illegible]1998~2010 [illegible] 1 205 [illegible] 1 207 [illegible] 99%[illegible] 1 226 [illegible] 1 229 [illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible] 95%[illegible]“[illegible]”[illegible] 92%[illegible]

2010 [illegible] 9 [illegible] 2010 [illegible] 11 [illegible] 5 [illegible]·[illegible] 30 [illegible]

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[illegible]“[illegible]”（La Crosse Loggers）[illegible]“logger”[illegible]“lager”[illegible]

[illegible]

[illegible]“[illegible]”

[illegible]

[illegible] 11 [illegible] 9 500 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]·[illegible]·[illegible]“[illegible]”[illegible]

[illegible]

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2007 [illegible] 5 [illegible] 12 [illegible]·[illegible] 0.247[illegible]“[illegible]”[illegible]

[illegible] 15 [illegible] 0.472[illegible] 4 [illegible] 0.158 [illegible] 0.336[illegible]

2007 [illegible] 7 [illegible]·[illegible]10 [illegible] 1918 [illegible]11 [illegible]“[illegible]”[illegible]24 [illegible]“[illegible]”[illegible]

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[illegible]

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[illegible] 3 [illegible]

1. [illegible]

2. [illegible]

3. [illegible]

[illegible] 1 [illegible]“[illegible]”[illegible]·[illegible]——20 [illegible] 70 [illegible]“[illegible]”——[illegible] 0.374[illegible] 0.264[illegible]

[illegible]

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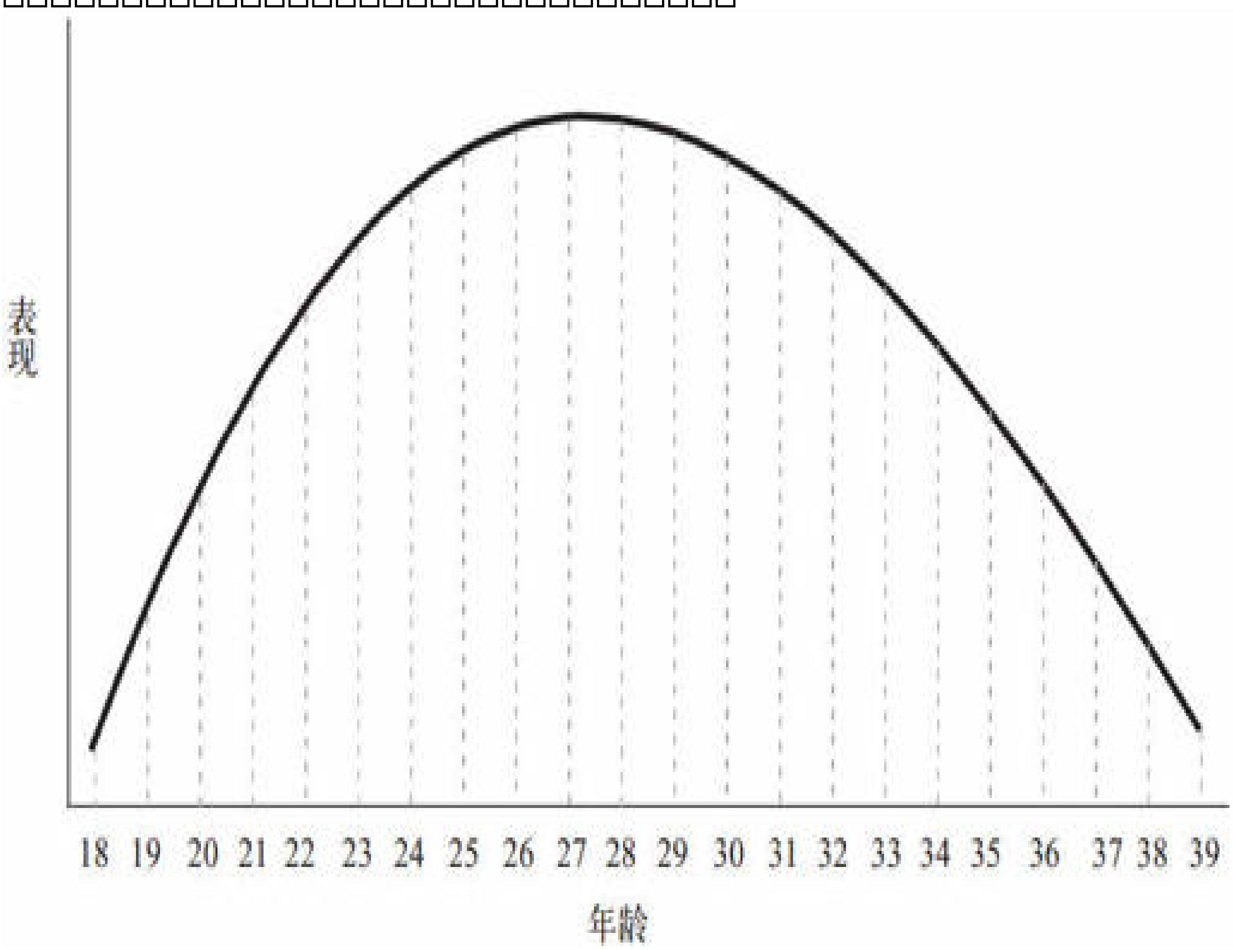
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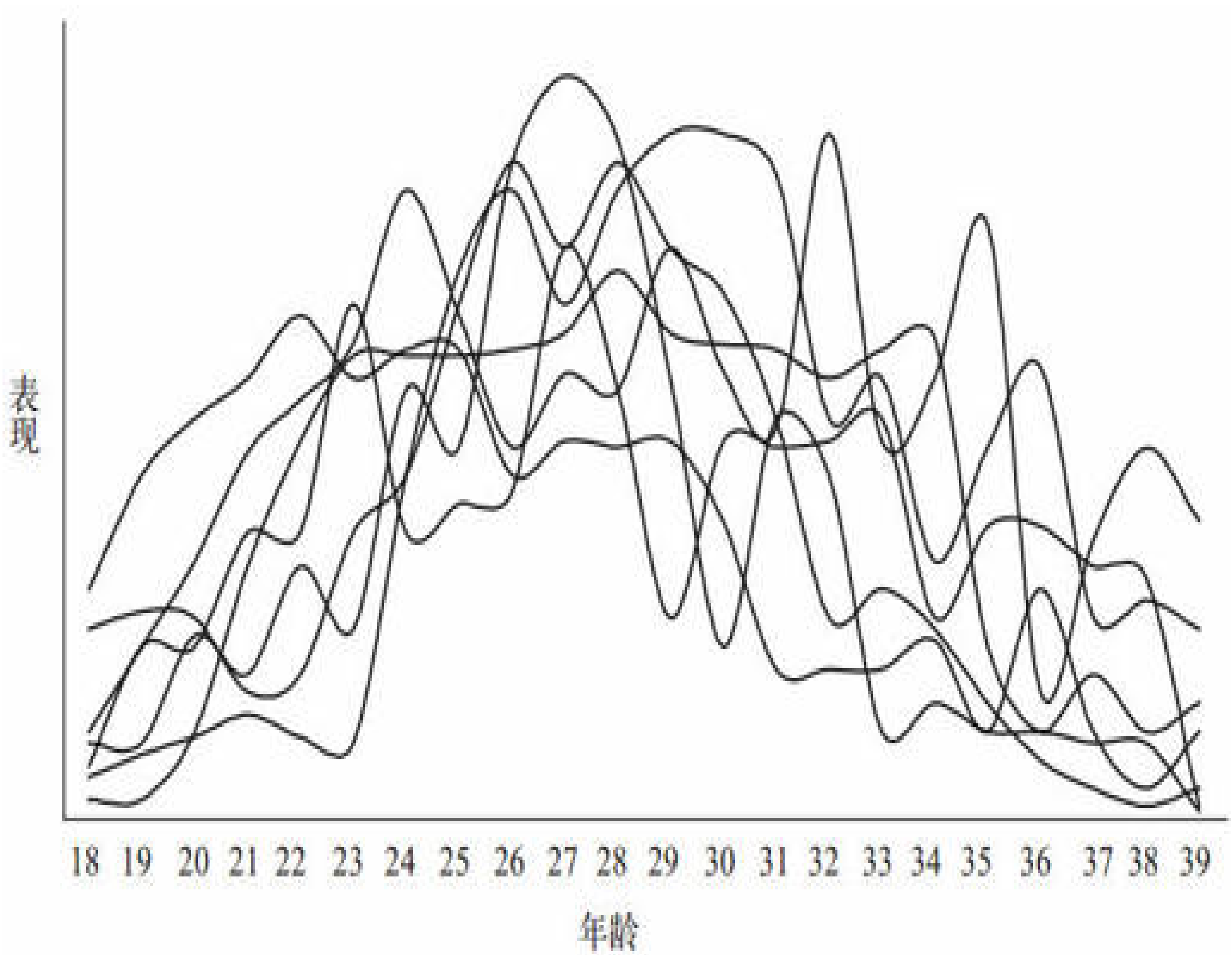
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表现
18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
年龄

[illegible]·[illegible]·[illegible]

[illegible] 9/10 [illegible]

[illegible] 100 [illegible] 100 [illegible]

[illegible]2002 [illegible]——[illegible] PECOTA [illegible] Excel [illegible]

[illegible] 10 000 [illegible]

PECOTA [illegible] PECOTA [illegible] 26 [illegible]

[illegible]·[illegible]

[illegible]2009 [illegible]PECOTA [illegible] 19 [illegible]“[illegible]”[illegible]·[illegible]·[illegible] 17 [illegible] 0.304[illegible] 450 [illegible]·[illegible] 2003 [illegible]

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[illegible]2009 [illegible]“[illegible]”[illegible]2010 [illegible] 30 [illegible] 8 [illegible]2011 [illegible] 0.227[illegible] 2011 [illegible]

[illegible]

[illegible]10 [illegible]

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2003 [illegible]·[illegible]

[illegible]·[illegible]“[illegible]”

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[illegible] 10 [illegible]2004 [illegible] 86 [illegible]2003 [illegible]“[illegible]”[illegible]“[illegible]”[illegible]

2007~2009 [illegible]“[illegible]”[illegible]40 [illegible]1/10[illegible] 4 [illegible] 4 000 [illegible]

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[illegible]

PECOTA [illegible]“[illegible]”[illegible]Pitcher Empirical Comparison and Optimization Test Algorithm[illegible] 20 [illegible] 80 [illegible]·[illegible]Bill Pecota[illegible]

PECOTA [illegible]——[illegible]——[illegible] WFG [illegible]——[illegible][1]——[illegible] PECOTA [illegible] PECOTA [illegible] PECOTA [illegible] 2003 [illegible]

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2006 [illegible] PECOTA [illegible] 100 [illegible]PECOTA [illegible] 6 [illegible]

2011 [illegible] 6 [illegible]“[illegible]”[illegible]

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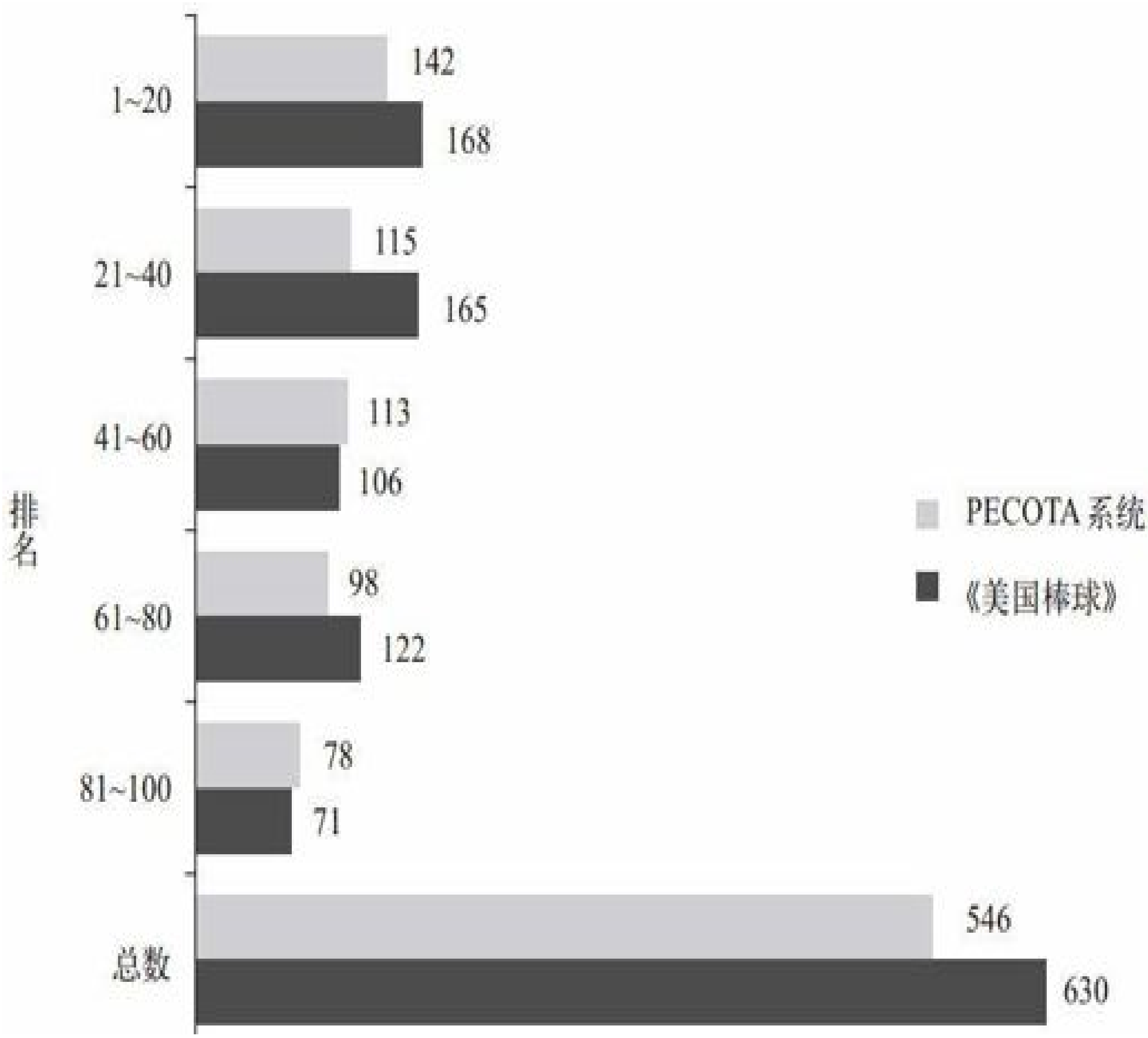
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PECOTA [illegible] 2011 [illegible] 546 [illegible] 3–3[illegible] 630 [illegible] 15%[illegible] 400 [illegible] 6 [illegible] 84 [illegible] 3.36 [illegible]



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[illegible]

[illegible] PECOTA [illegible] PECOTA [illegible]

[illegible] PECOTA [illegible]

[illegible]

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[illegible]

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[illegible]

[illegible] 8 [illegible] 240 [illegible]

[illegible]·[illegible]

[illegible]

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[illegible]

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1980 [illegible] 148 [illegible] 0.219[illegible]·[illegible]

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[illegible]

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“[illegible]”[illegible]

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[illegible]

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[illegible] 20~80 [illegible]

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[illegible]

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2004 [illegible] 65 [illegible]

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[illegible]“[illegible]”[illegible]

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[illegible]

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[illegible]

2005 [illegible] 8 [illegible] 23 [illegible] 12 [illegible]

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[illegible]“[illegible]”[illegible]·[illegible]“[illegible]”

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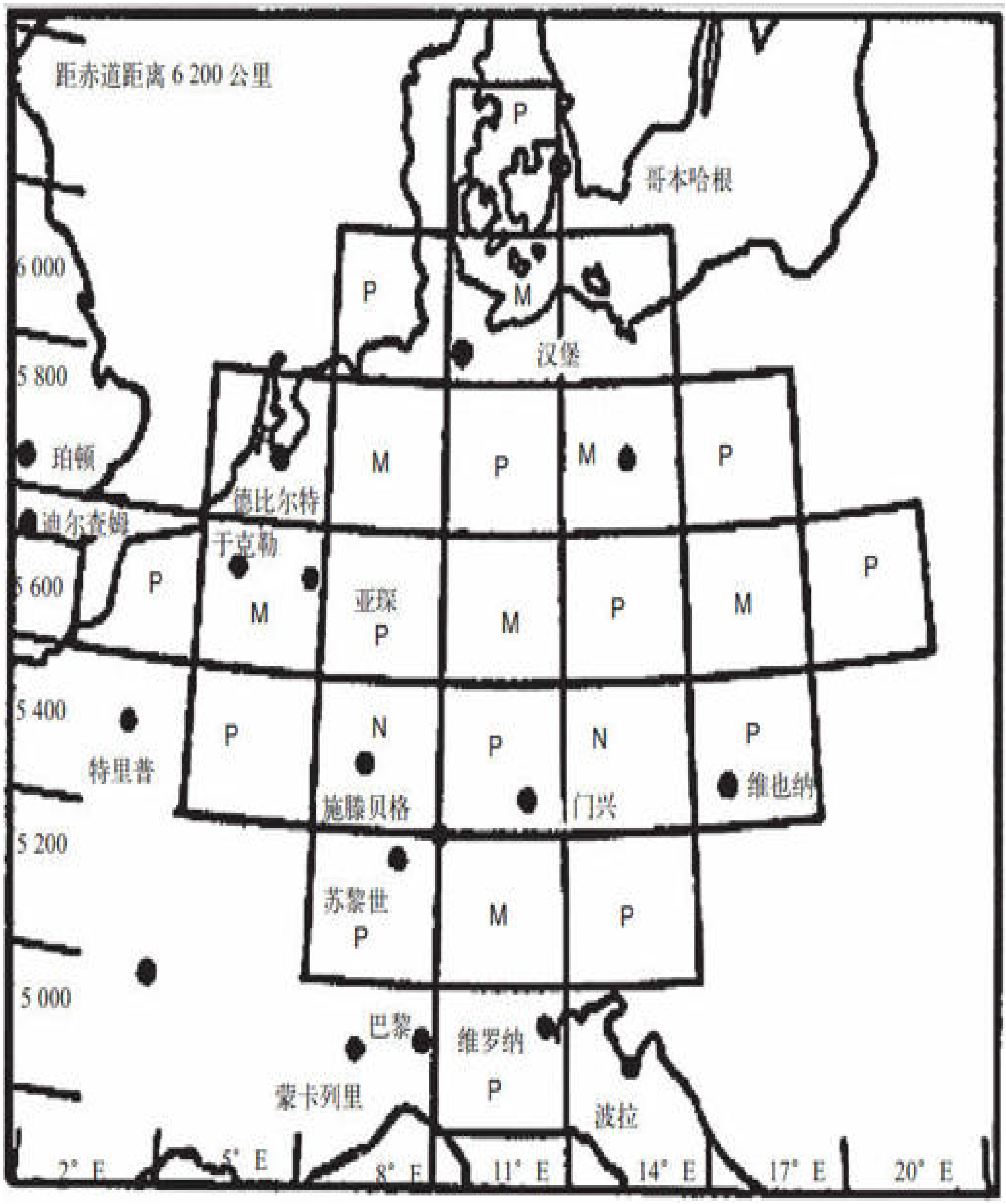
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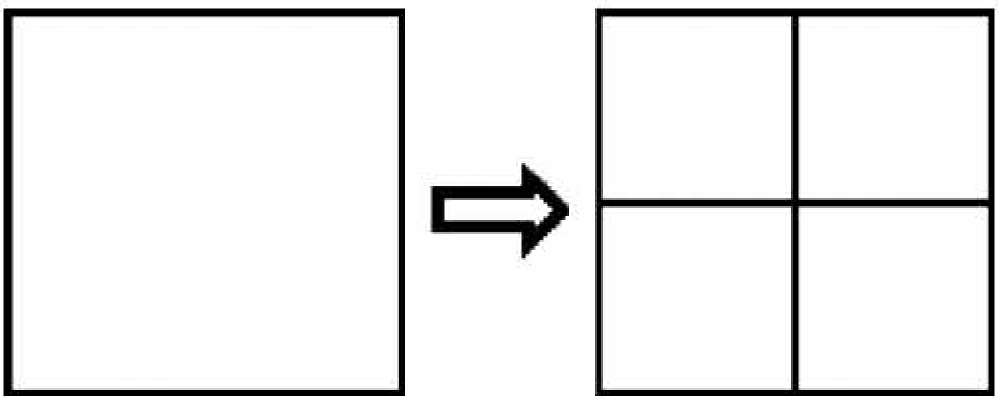

距赤道距离 6 200 公里
哥本哈根
6 000
汉堡
5 800
珀顿
德比尔特
迪尔査姆
于克勒
5 600
亚琛
5 400
特里普
施滕贝格
门兴
维也纳
5 200
苏黎世
5 000
巴黎
维罗纳
蒙卡列里
波拉
2° E
5° E
8° E
11° E
14° E
17° E
20° E

4-1

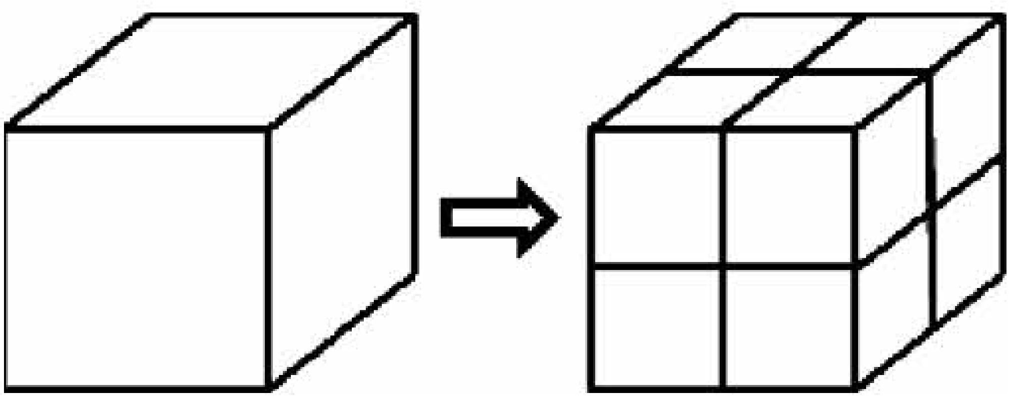
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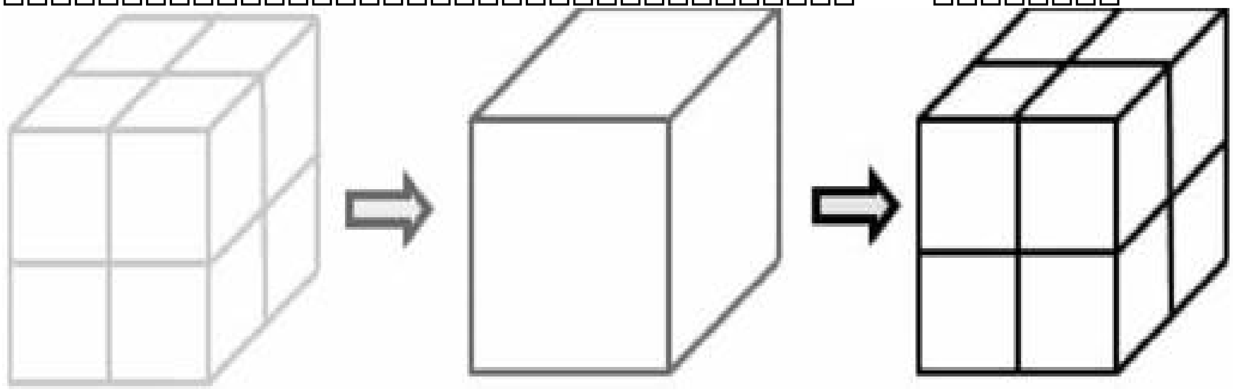
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[illegible] 8 [illegible]



[illegible] 64 [illegible] 40×40×40 [illegible]



29.517[illegible]

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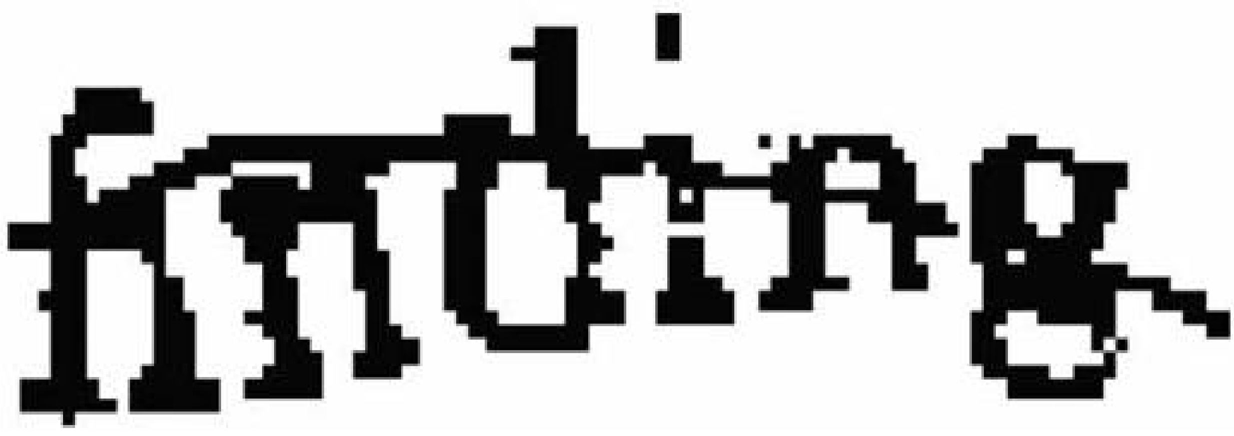
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[illegible] 4-3 [illegible]

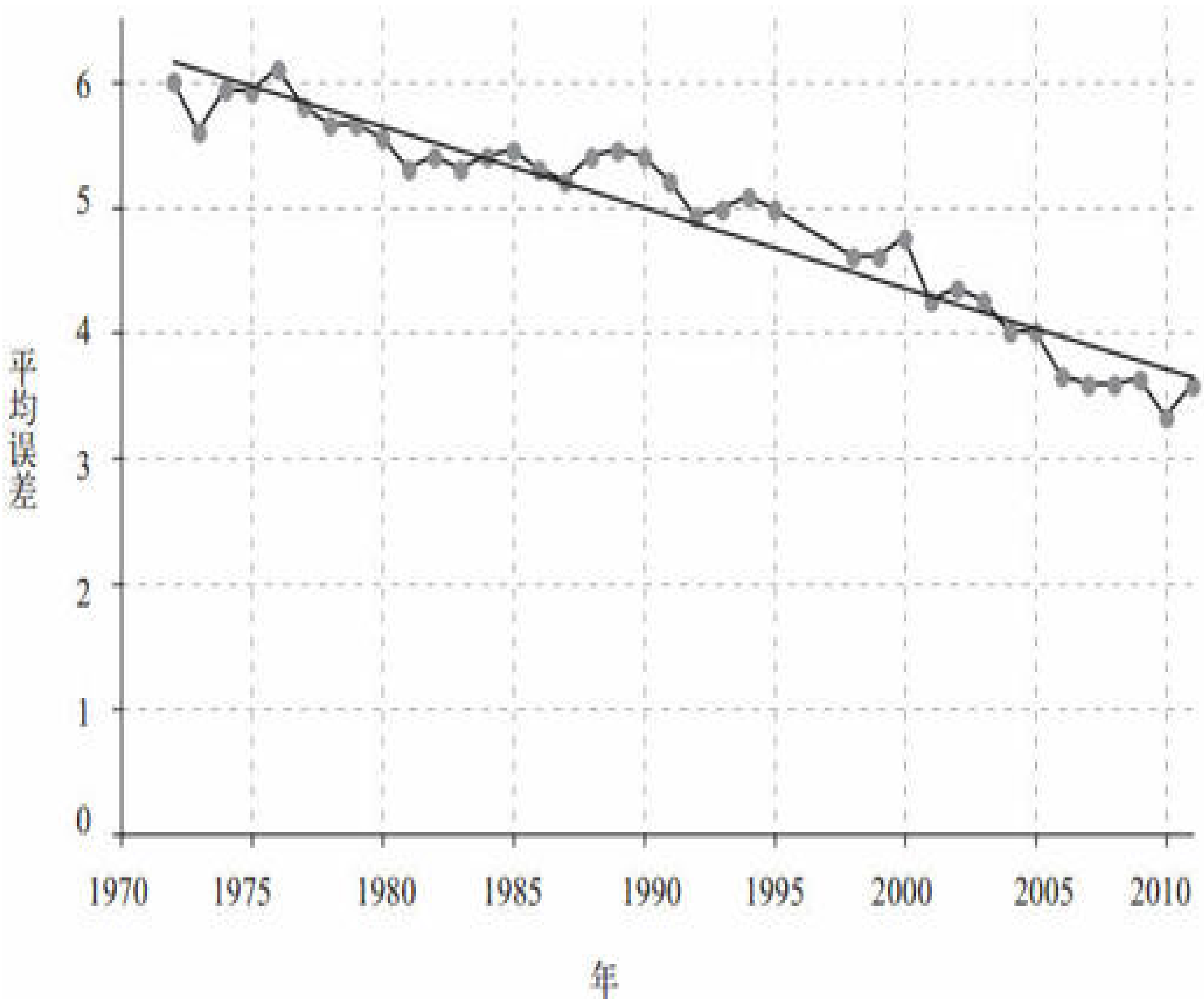
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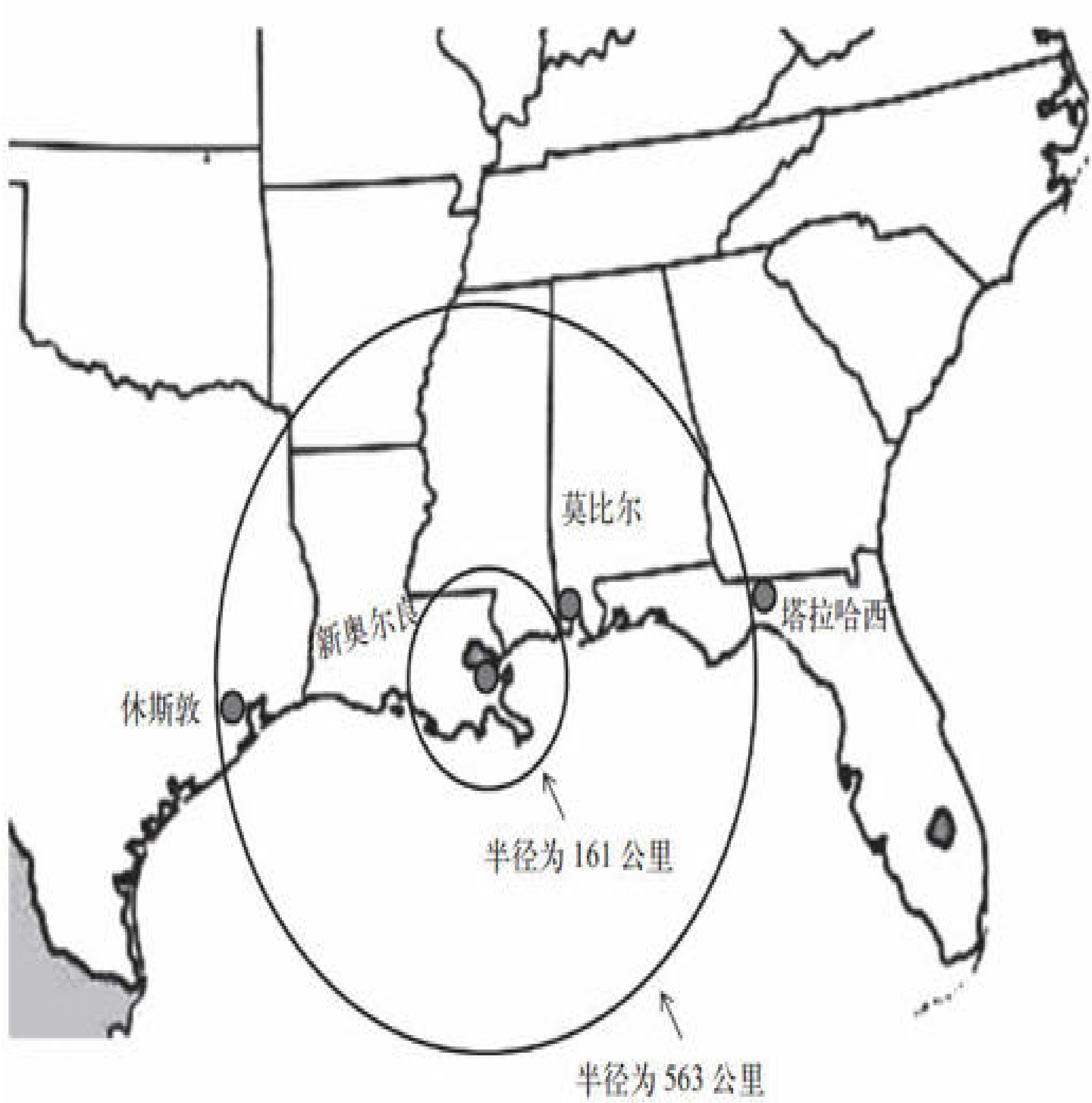
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[illegible]

[illegible]

[illegible] AccuWeather [illegible] TWC [illegible] Weather.com [illegible] Weather.gov [illegible] 10 [illegible]

[illegible]

[illegible]

[illegible]

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1993 [illegible]·[illegible] 3 [illegible]

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2. [illegible]

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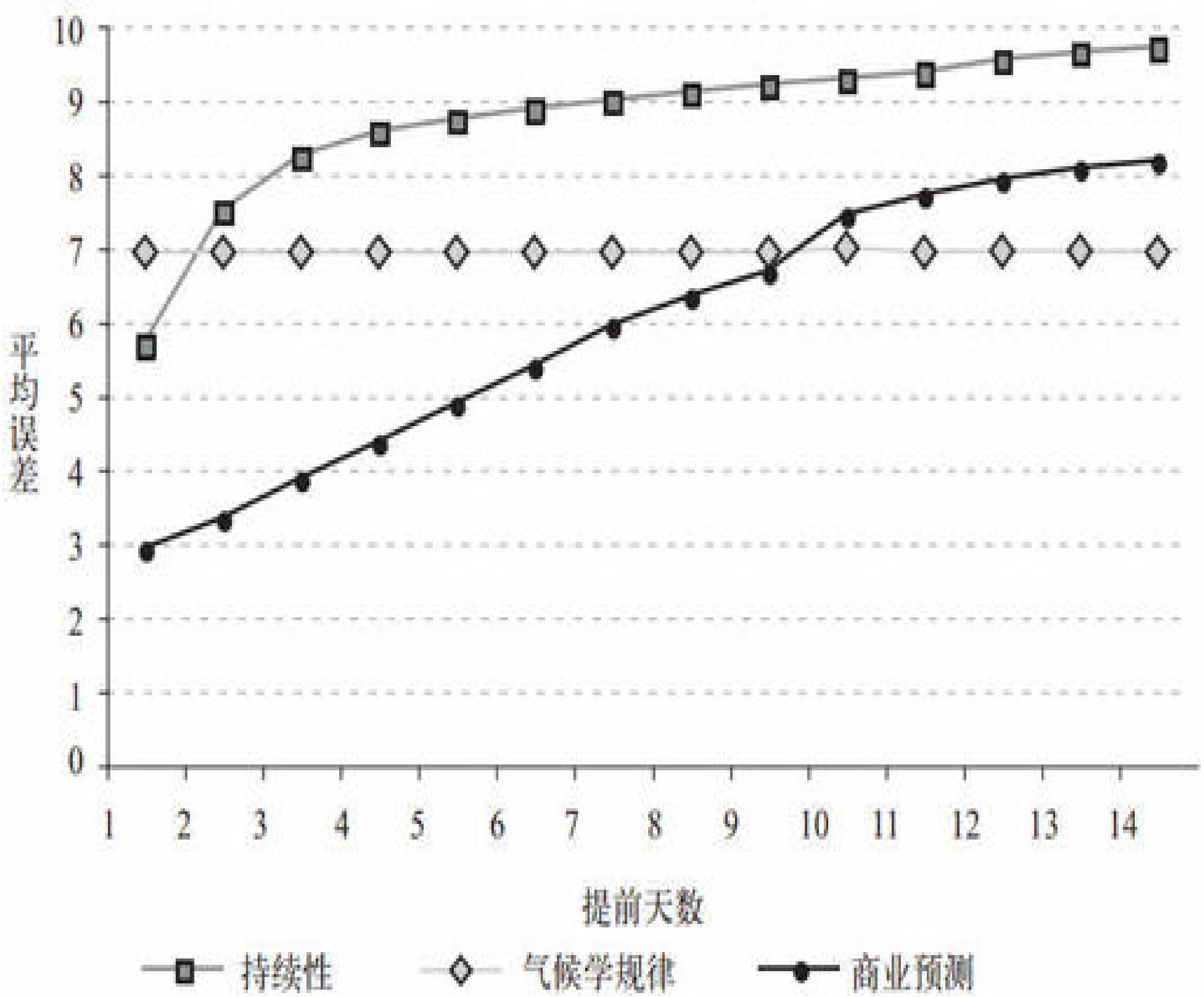
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[illegible] 16 [illegible] 20 [illegible]



[illegible] 4–6 [illegible]

[illegible]

[illegible] 10 [illegible] AccuWeather [illegible] 15 [illegible]

[illegible]

[illegible] 50% [illegible] 60% [illegible] 40% [illegible]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible] 60%[illegible]

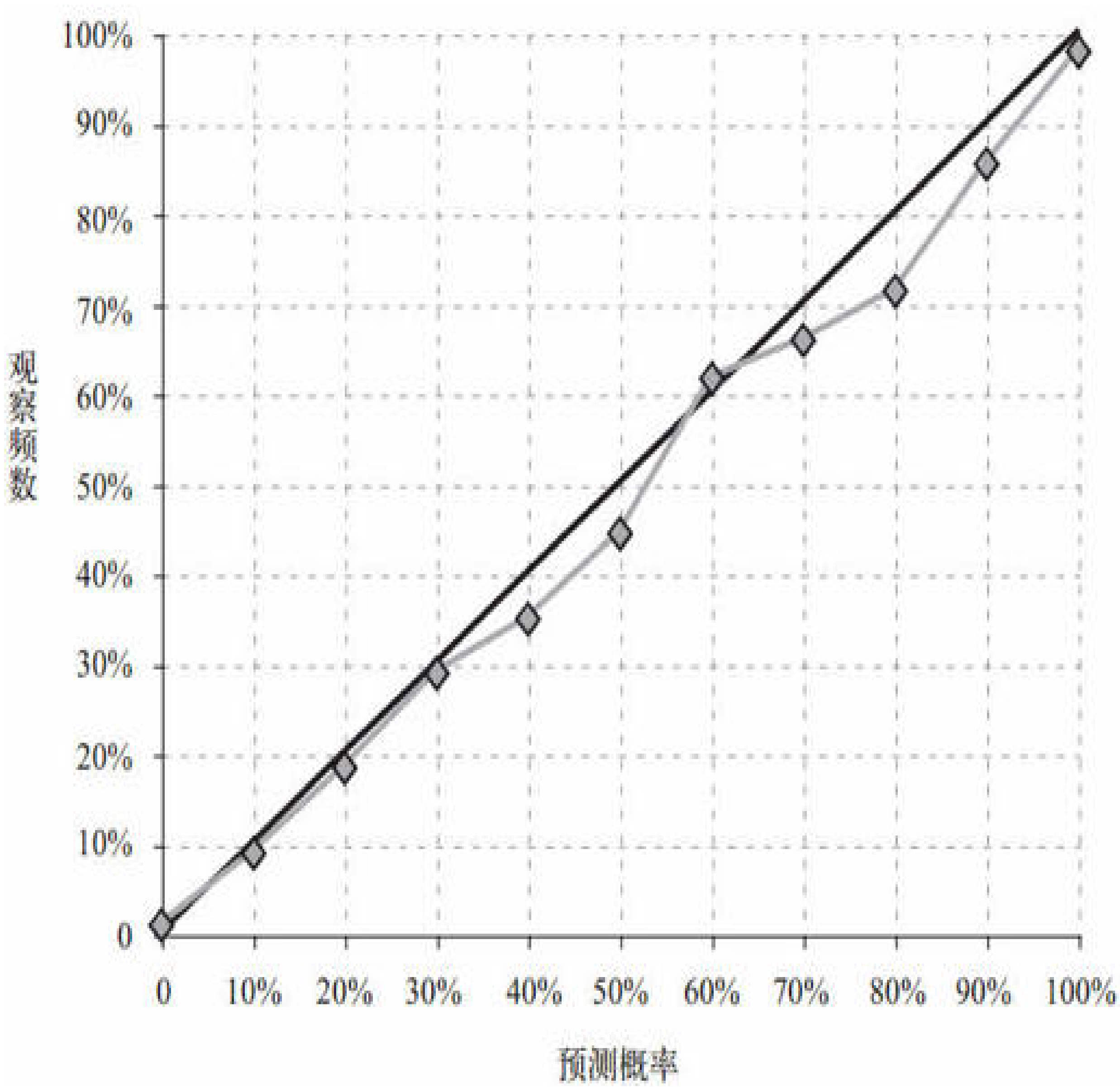
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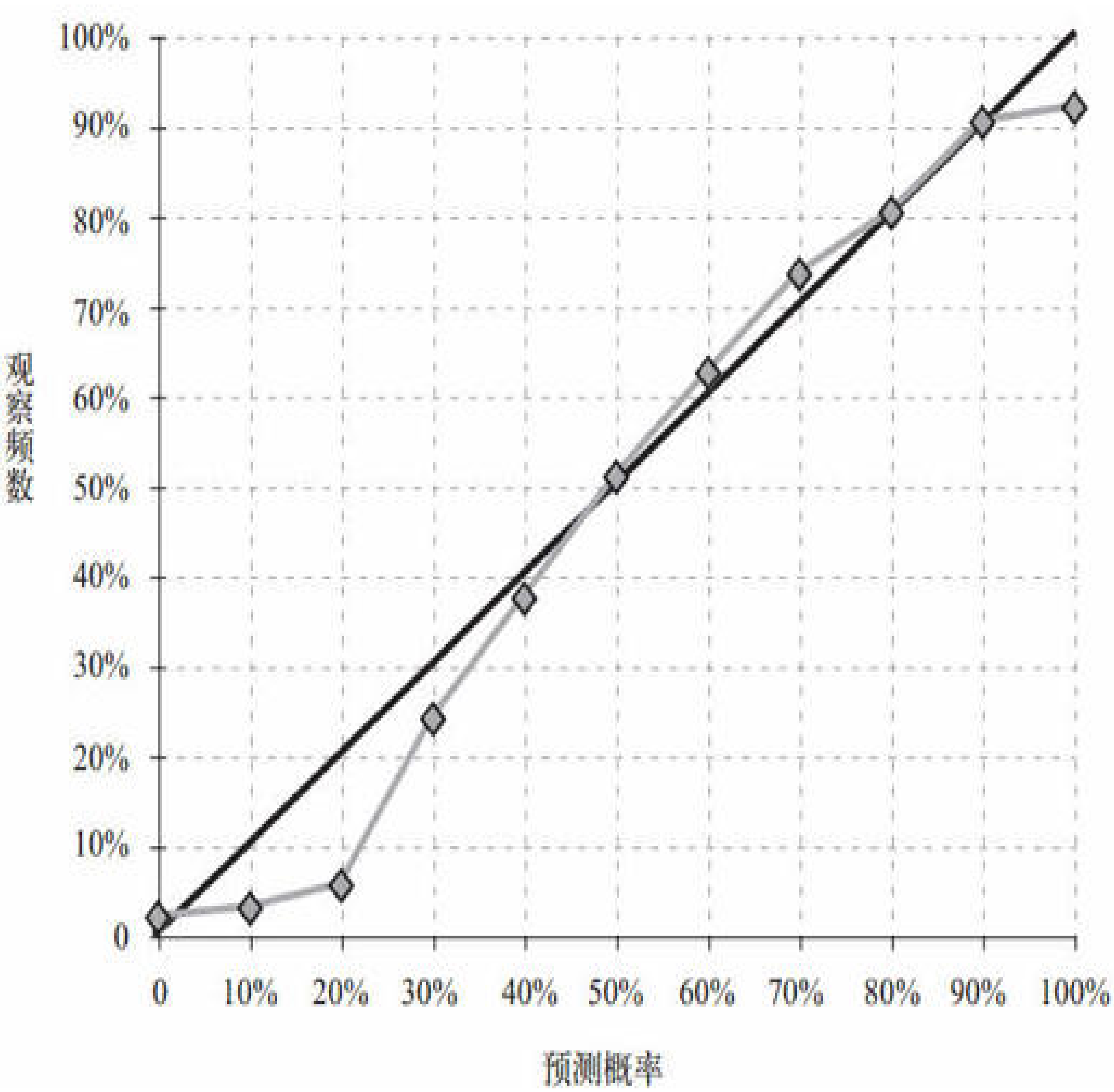


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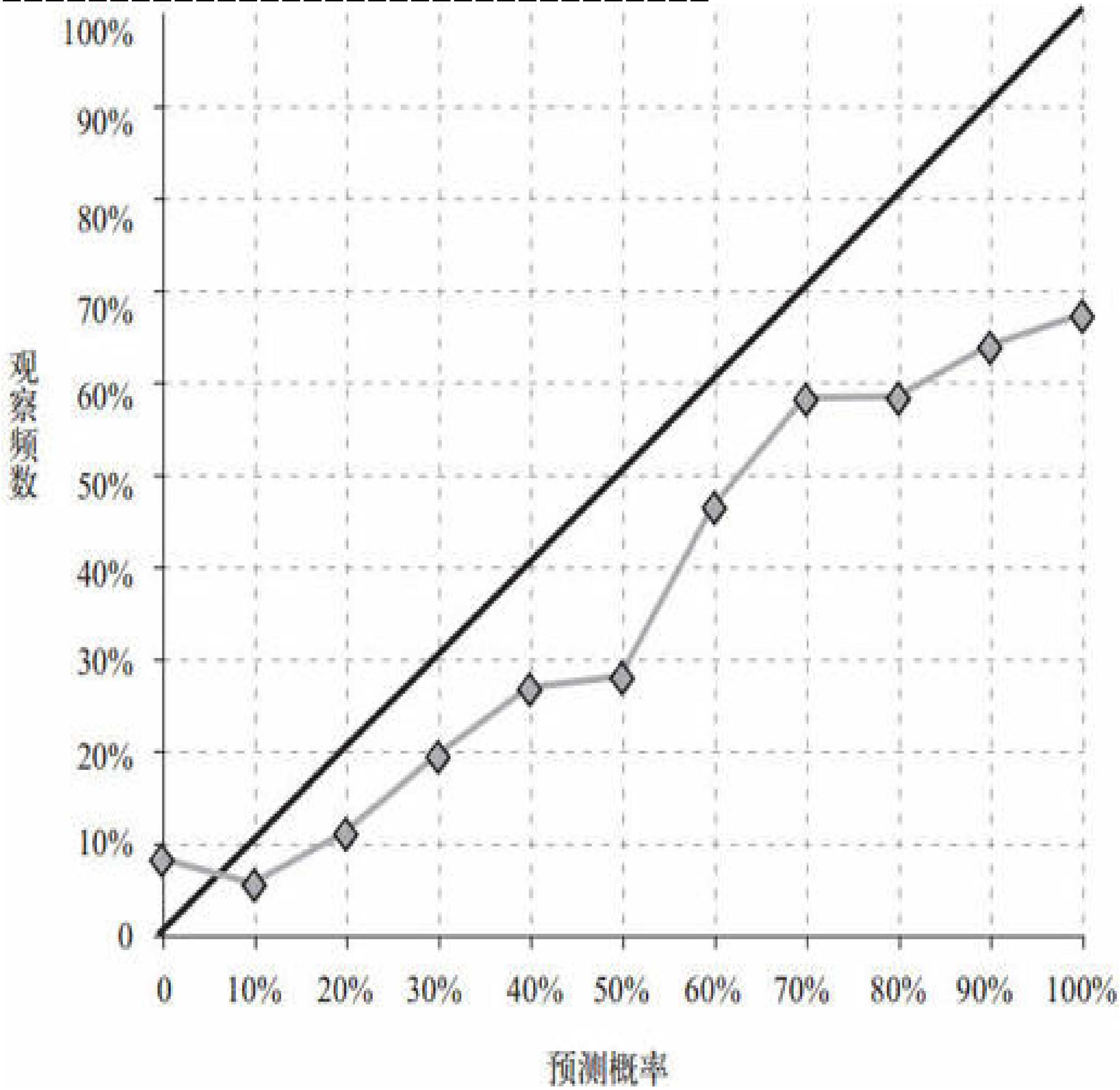
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[illegible] 100%[illegible] 1/3 [illegible] 4–9[illegible]

[illegible]“[illegible]”[illegible]“[illegible]



观察频数
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0
0
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
预测概率

[illegible] **4–9** [illegible]

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2009 [illegible] 4 [illegible] 11 [illegible] 3.9 [illegible] 3.5 [illegible]

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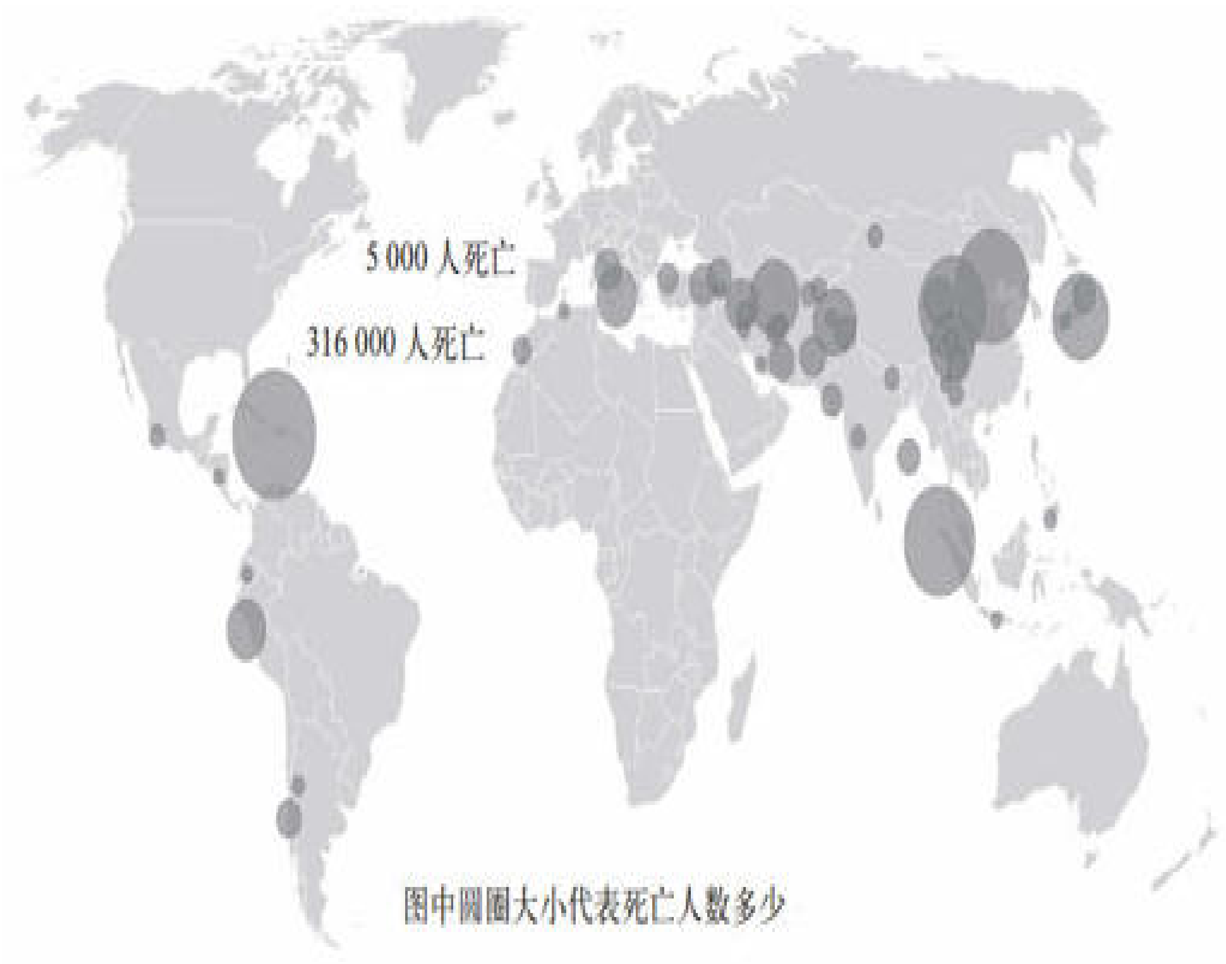
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[illegible] 5–1 [illegible] 1900 [illegible]

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[illegible] 2013 [illegible]22 [illegible]

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1. [illegible]6 [illegible] 28 [illegible]

2. [illegible] 30 [illegible] 60%[illegible]

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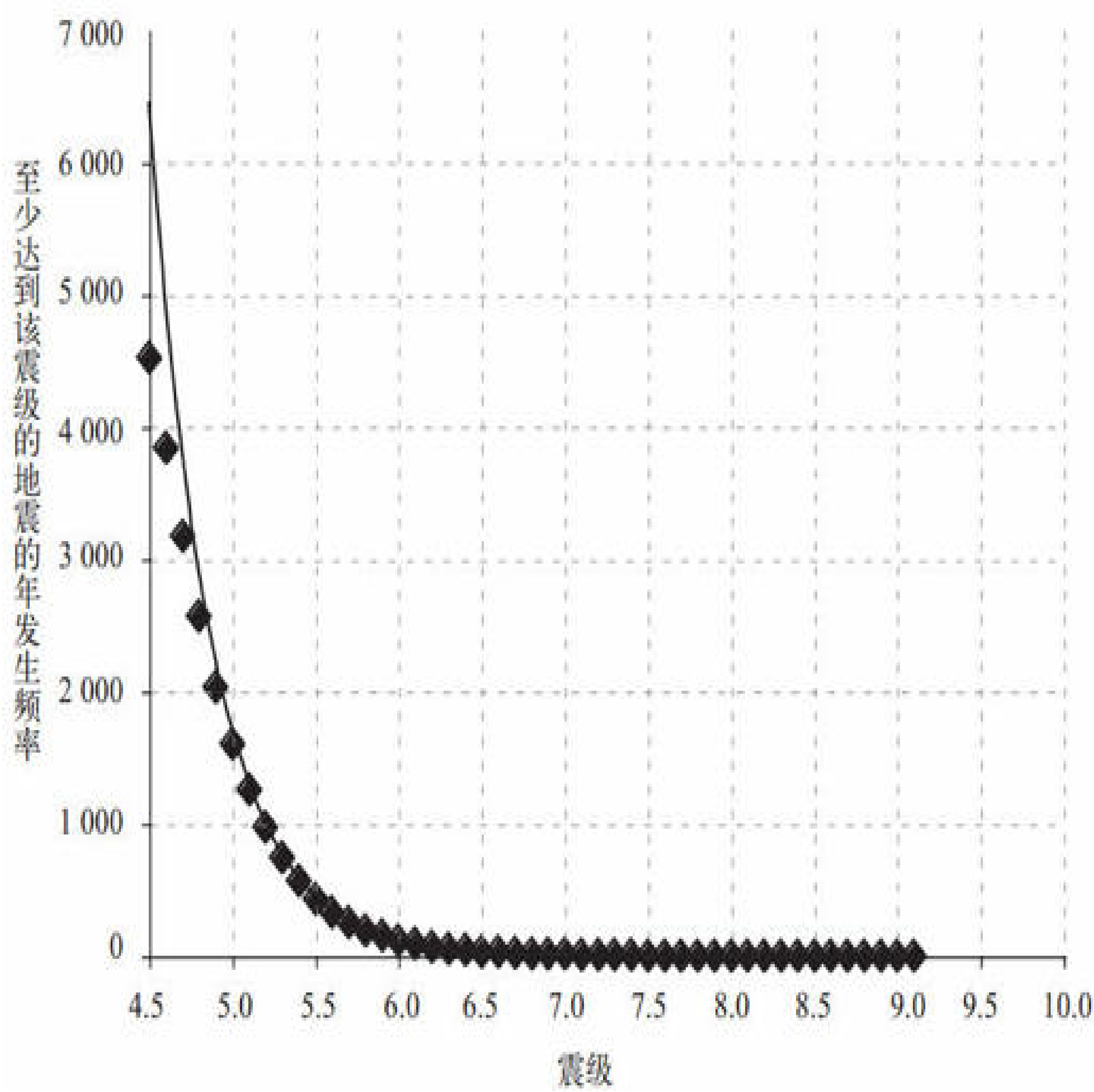
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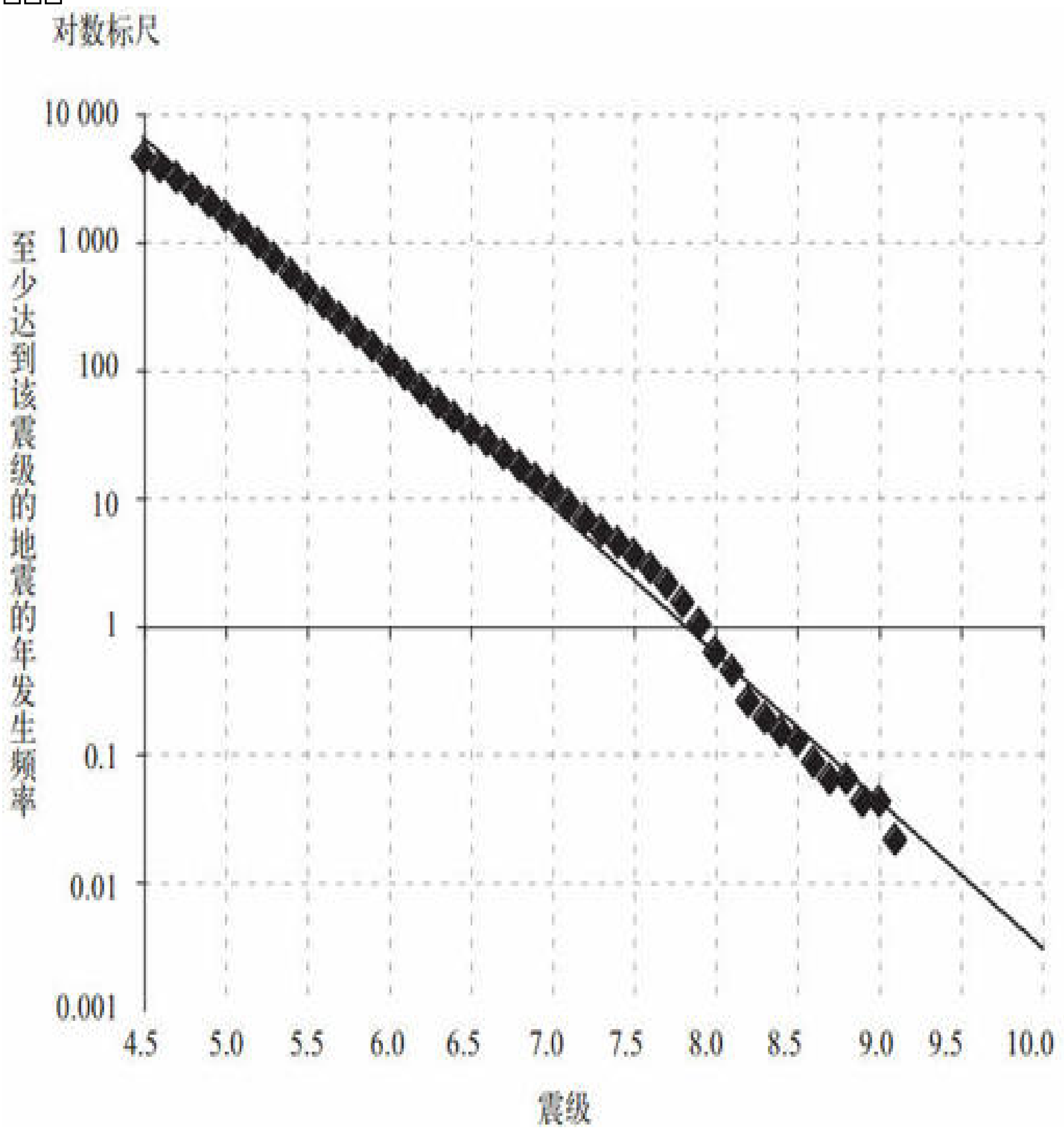
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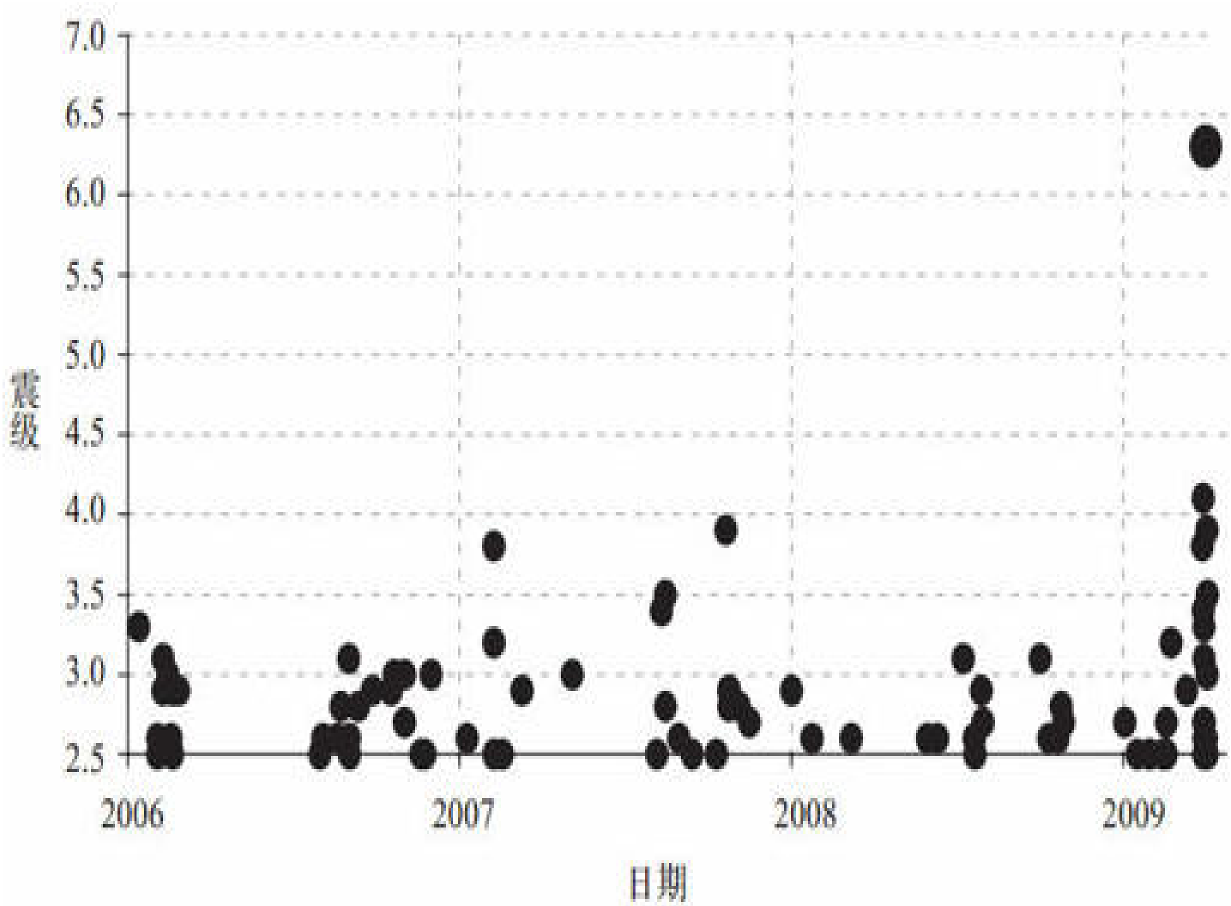
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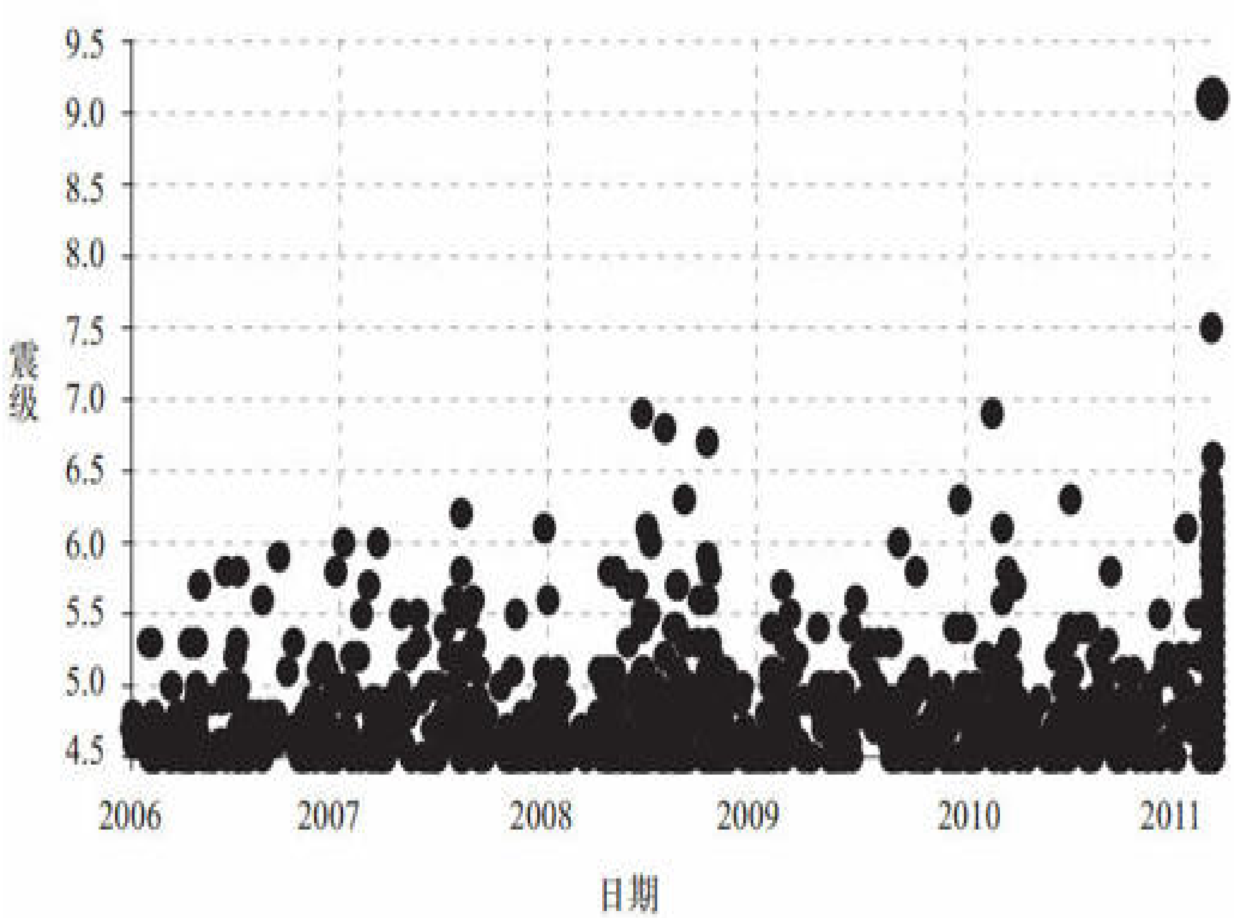
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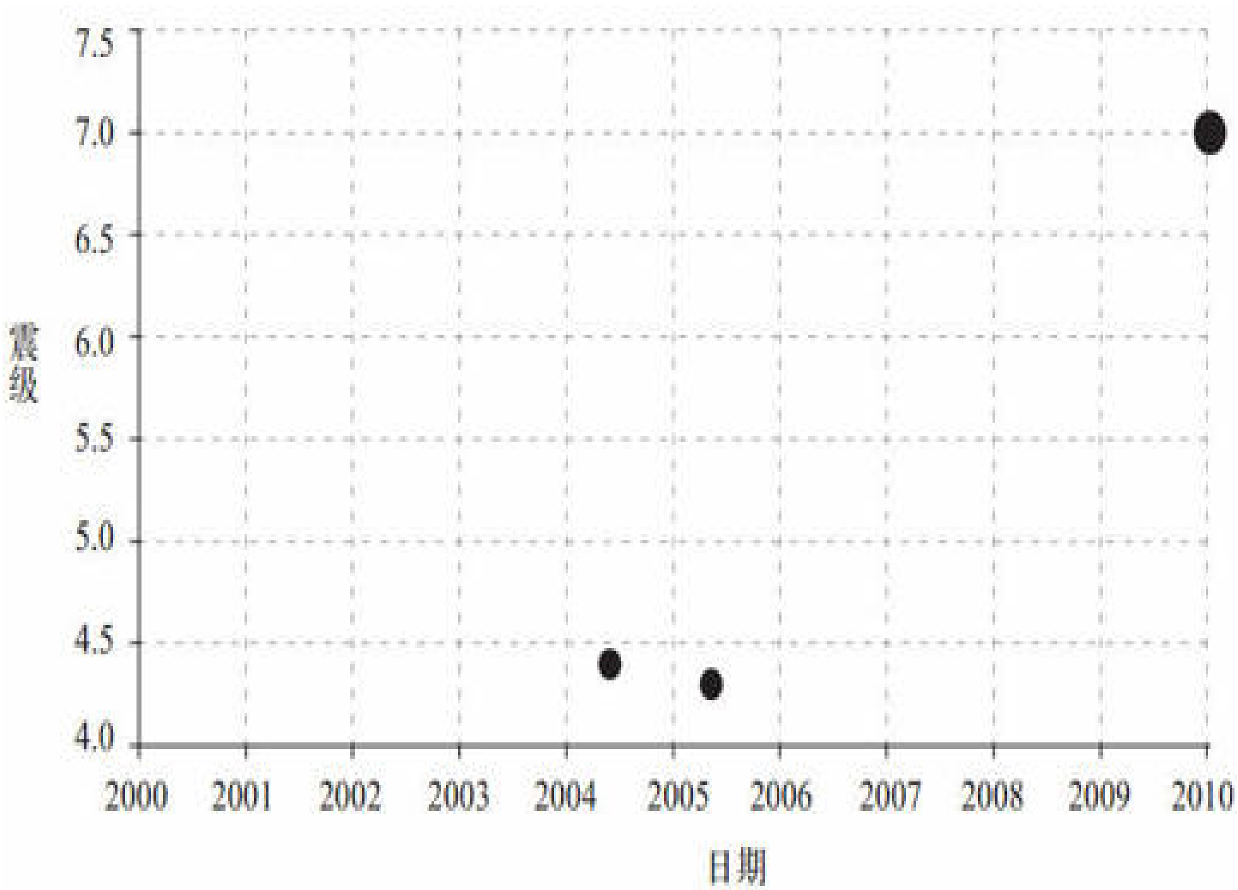
□ 5–3A □□□□□□□□□□□□□□□□2006 □ 1 □ 1 □ ~2009 □ 4 □ 6 □□

□□□□□□□□□□□□ 2011 □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ 5–3B□□2008 □□□□□□□□□□□□□□□□□□□ 5.5~7.0 □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□2011 □ 3 □ 9 □□□□□□□□□□□□□□□□□□□ 7.5 □□55 □□□□□□□□□□□□□ 9.1 □□□□□□



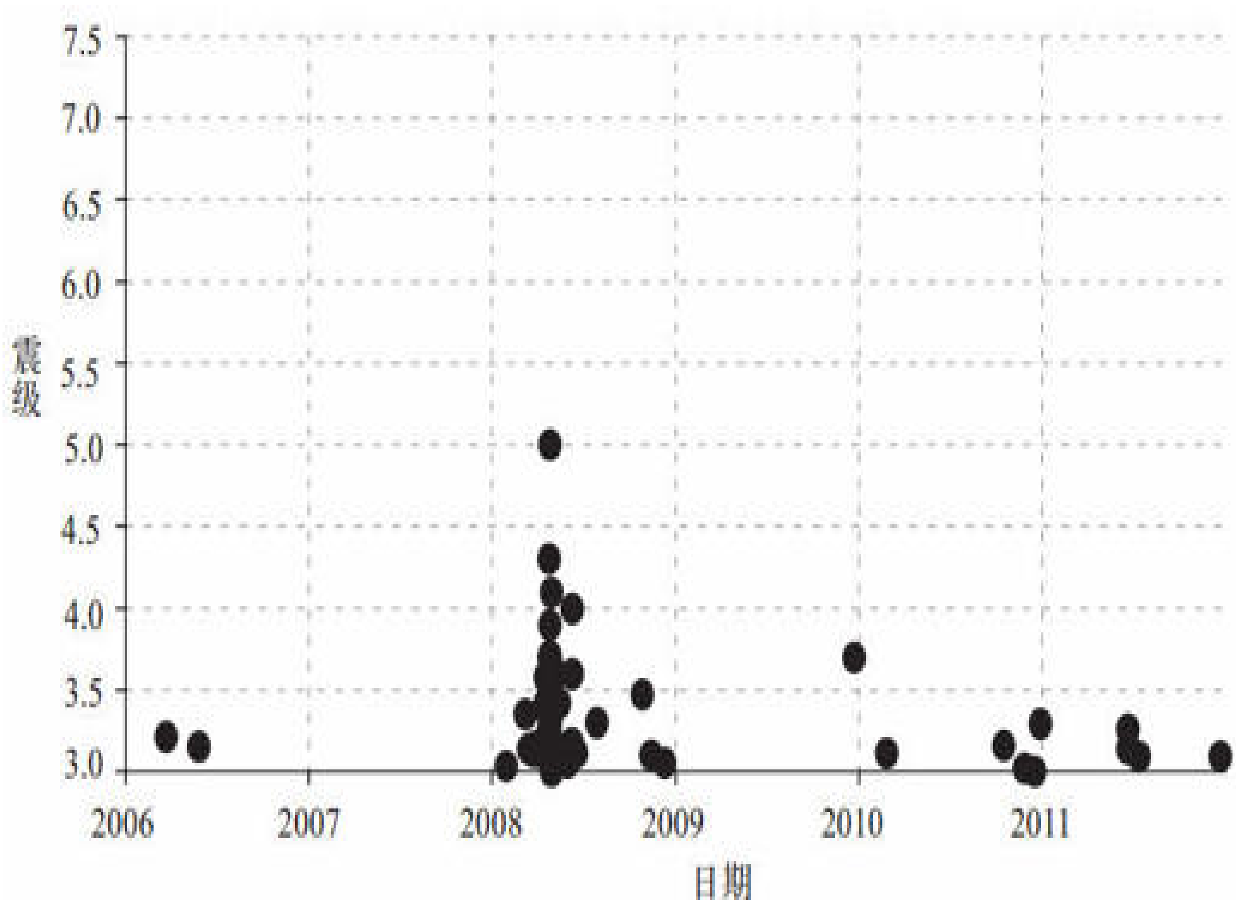
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2004 [illegible]–[illegible]–[illegible] 8 [illegible] 2003 [illegible]

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2007 [illegible]“[illegible]”[illegible]

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[illegible]“[illegible] 15 000 [illegible]”

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[illegible]

[illegible]

[illegible]

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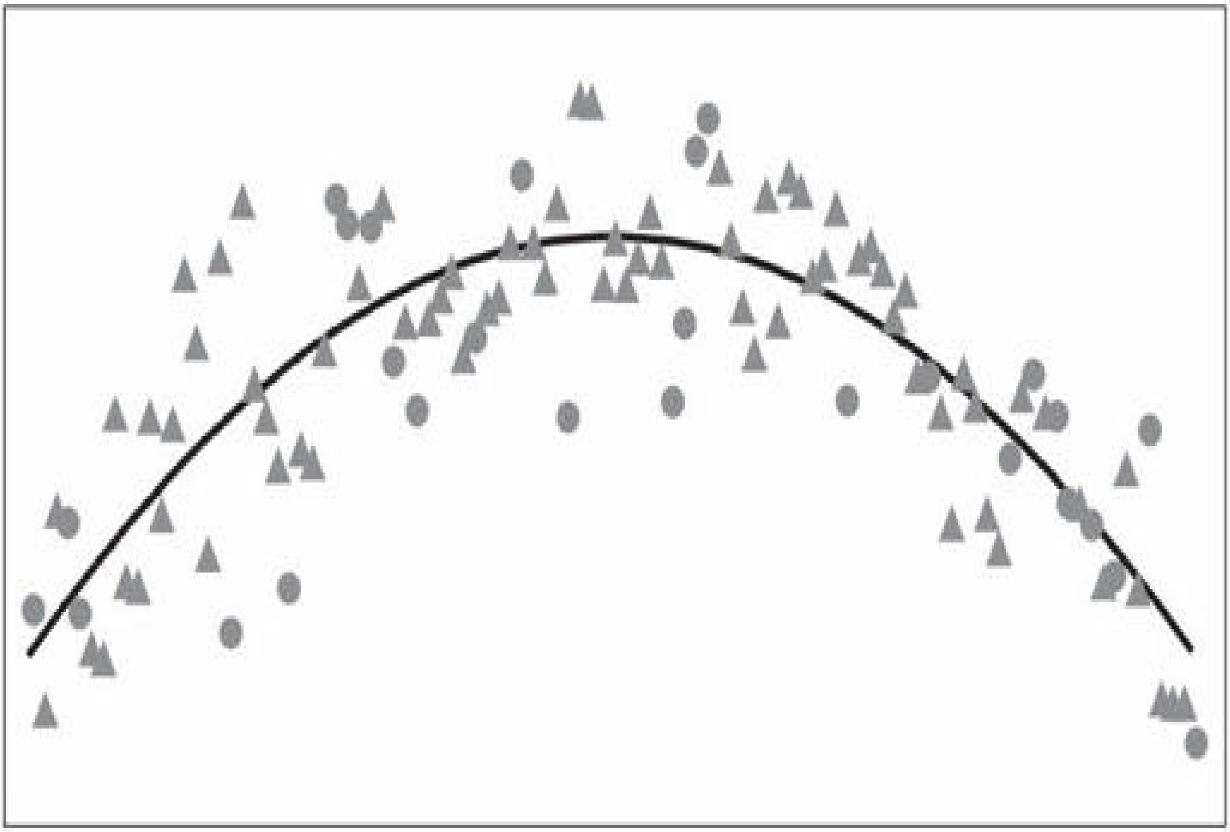
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[illegible]

[illegible]——[illegible] 5–4 [illegible]

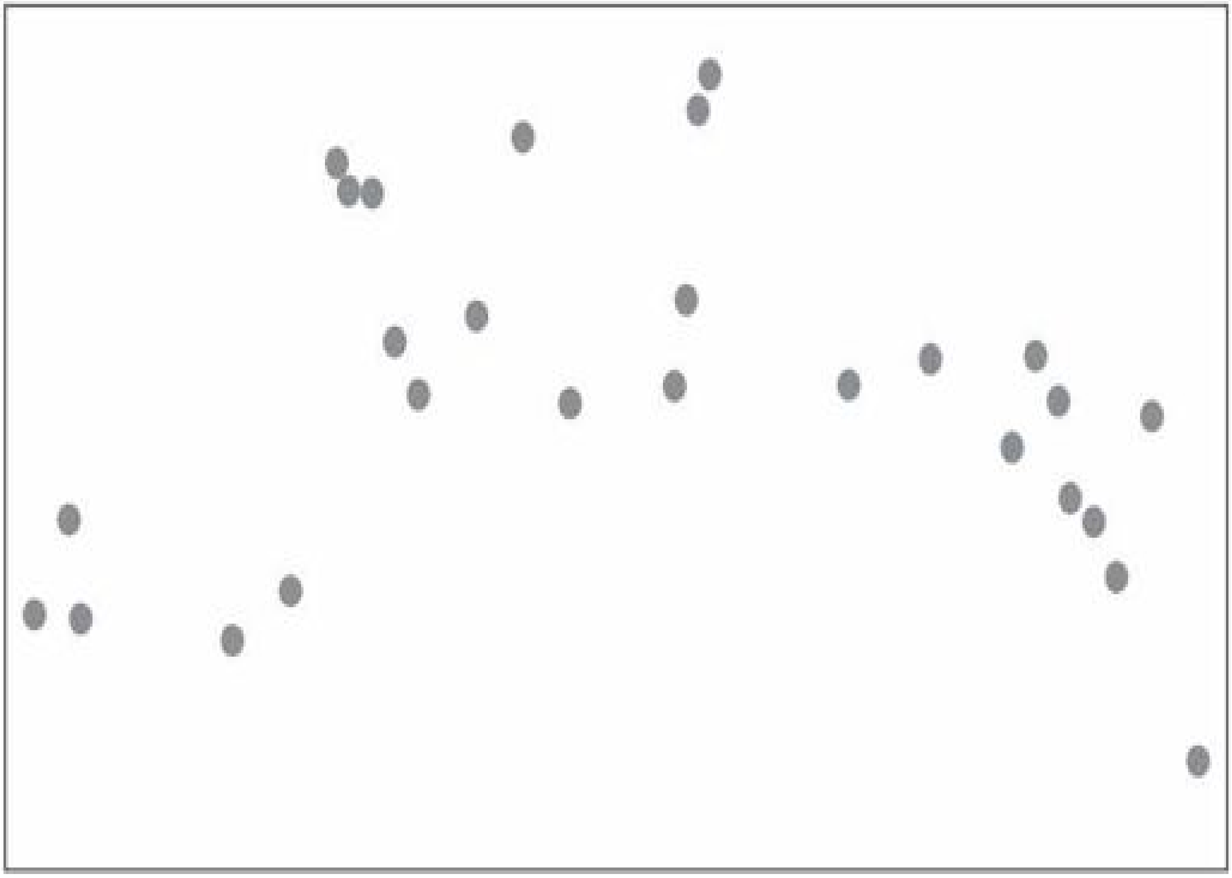
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[illegible] 5–5A [illegible] 100 [illegible] 25 [illegible]



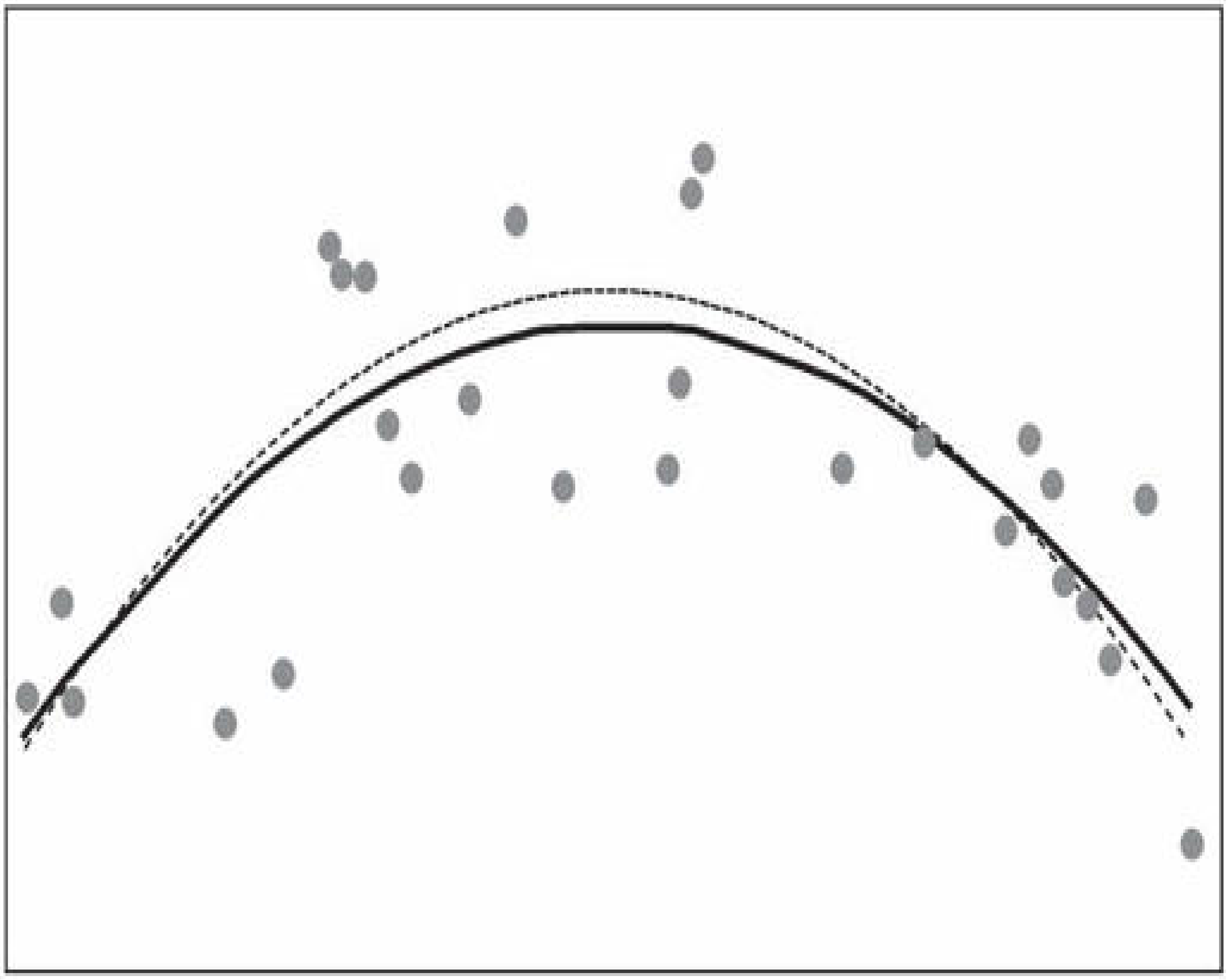
[illegible] **5–4** [illegible]

[illegible] 5–5B[illegible]

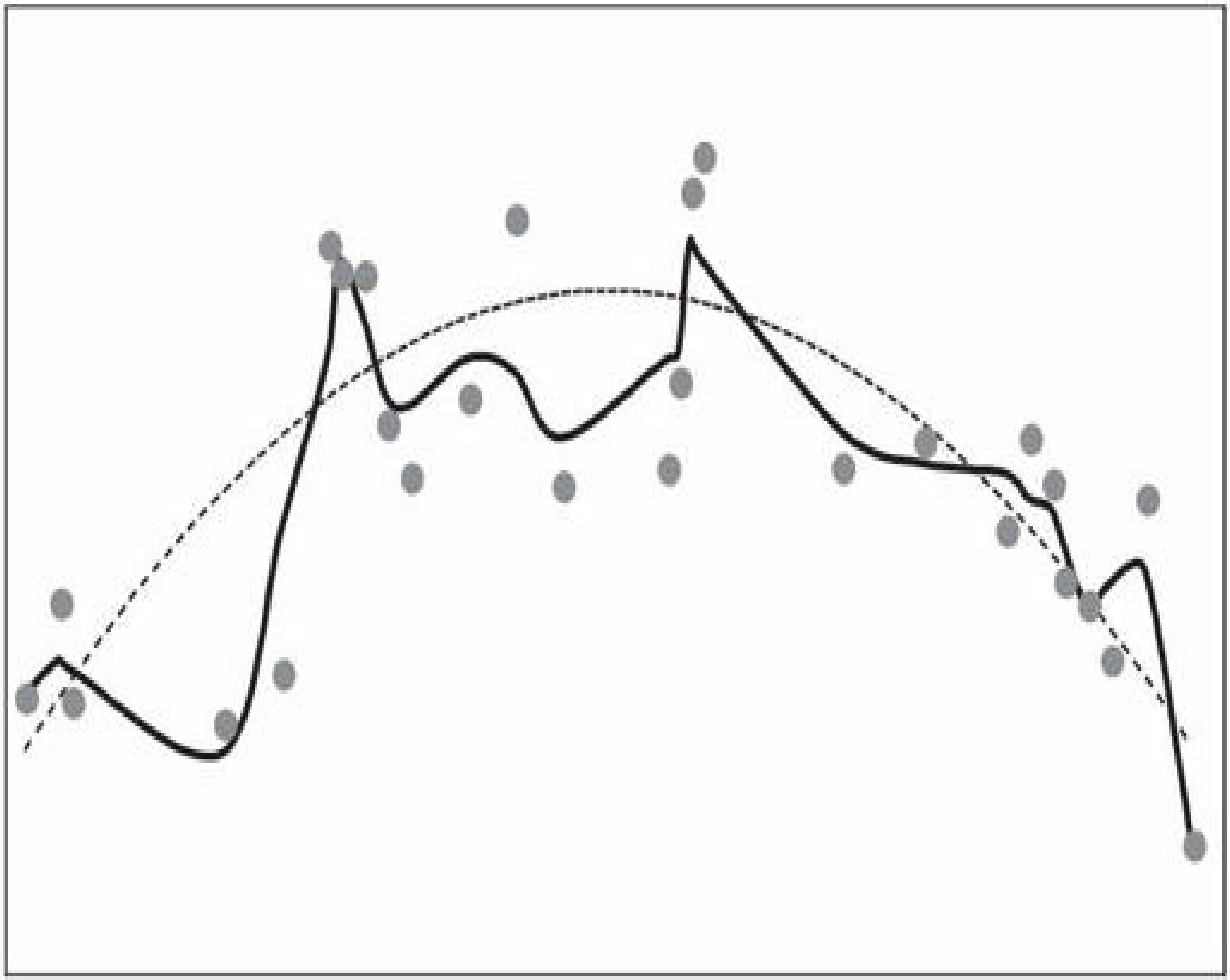


[illegible] **5–5A** [illegible]

[illegible] 5–5C [illegible]



5–5B



[illegible] 5–5C [illegible]

[illegible] 5–5C[illegible] 85%[illegible] 56%[illegible]

[illegible]·[illegible]·[illegible]“[illegible] 4 [illegible] 5 [illegible]”

[illegible]——[illegible]

[illegible]–[illegible]——[illegible] 3/23[illegible]·[illegible]

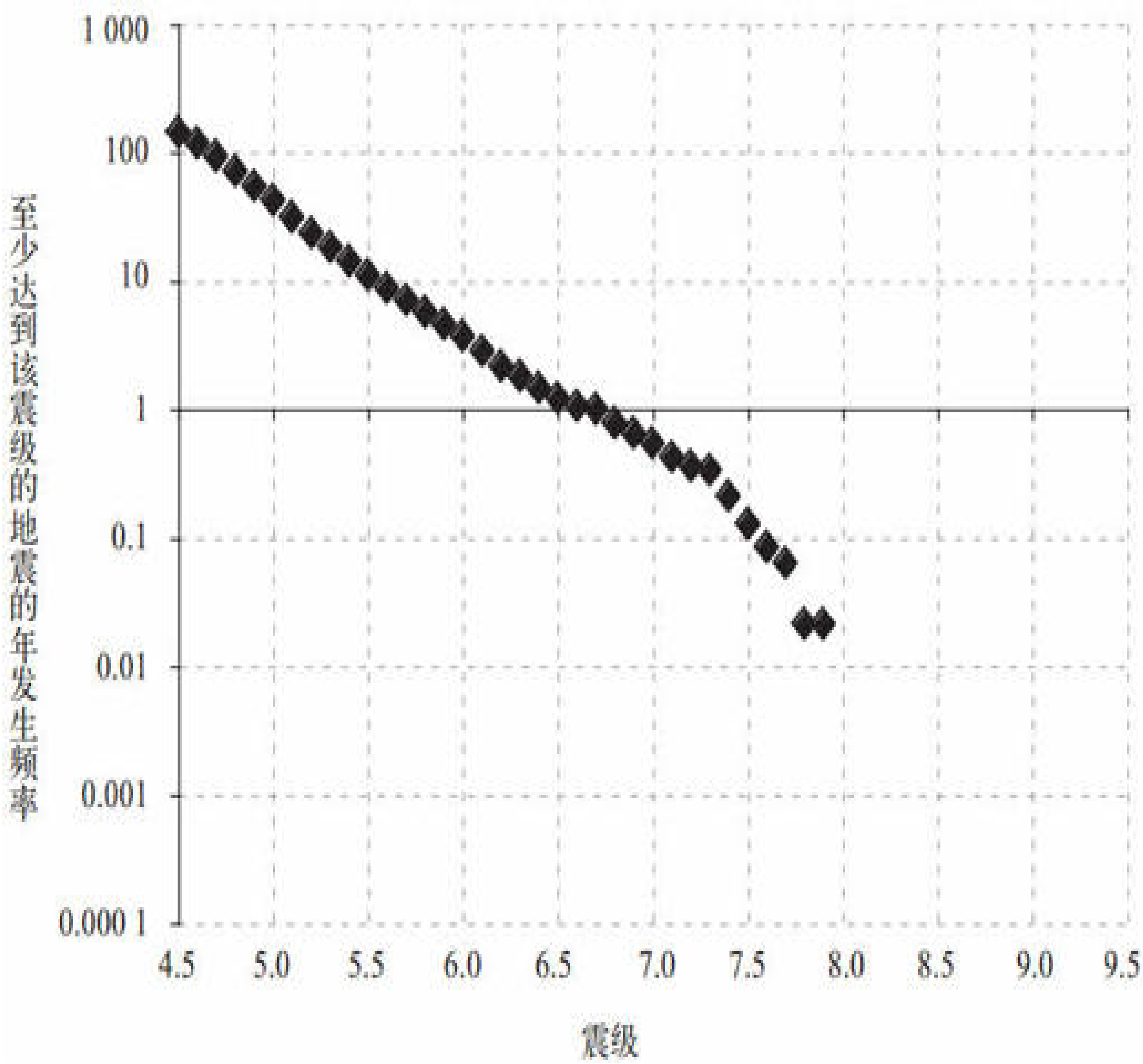
[illegible][1][illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]

2011 [illegible]

[illegible] 2011 [illegible] 8.6 [illegible] 9.1 [illegible]2011 [illegible] 40 [illegible]

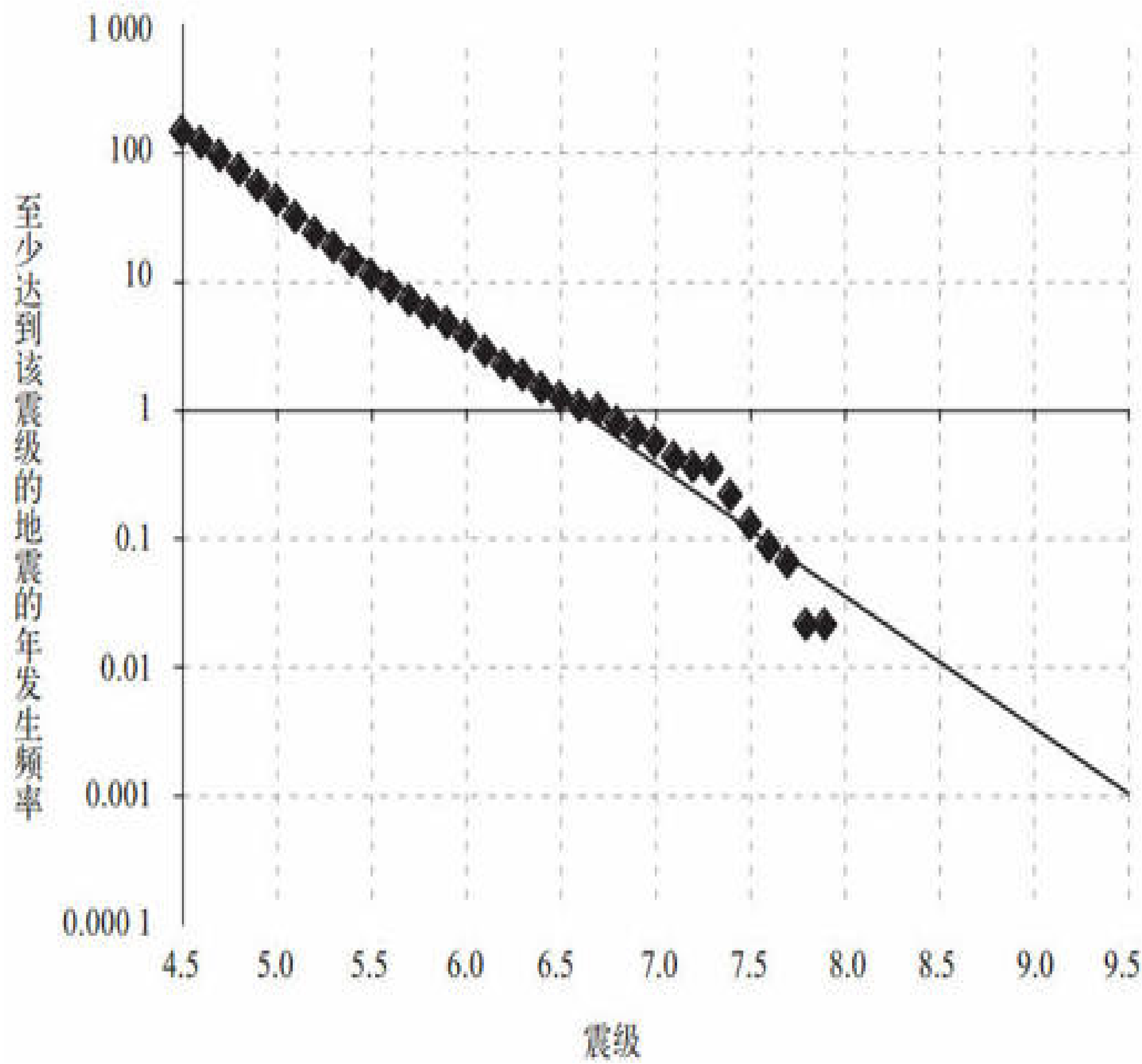
9.1 [illegible] 10 [illegible]

[illegible] 5–6A [illegible] 2011 [illegible] 3 [illegible] 11 [illegible] 9.1 [illegible]–[illegible] 7.5 [illegible] 1964 [illegible] 8.0 [illegible]

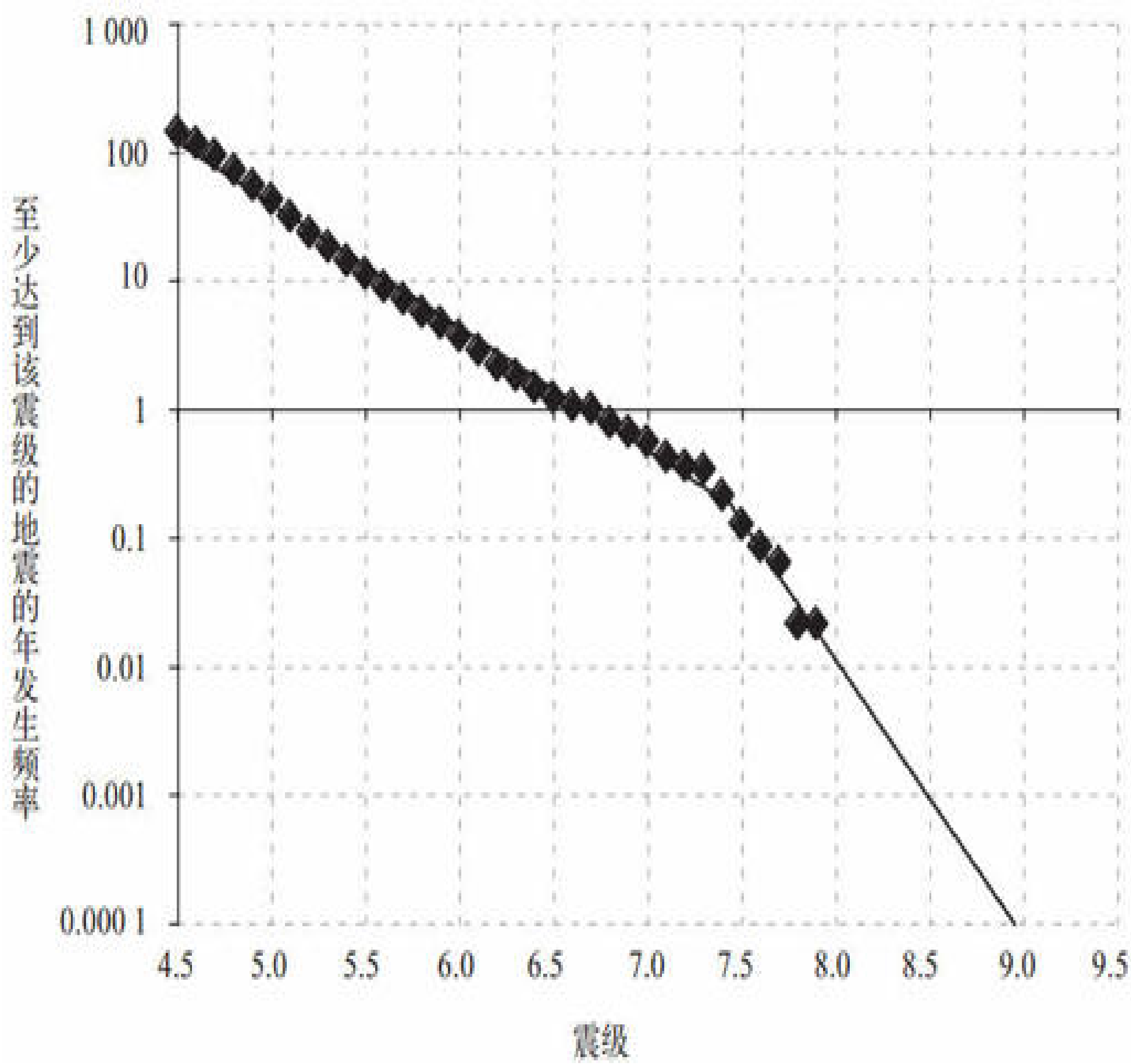


[illegible] 5–6A [illegible]1964 [illegible] 1 [illegible] 1 [illegible] ~2011 [illegible] 3 [illegible] 10 [illegible]

[illegible]–[illegible] 5–6B [illegible]“[illegible]”[illegible] 5–6C[illegible] 7.6 [illegible]


1 000
100
10
1
0.1
0.01
0.001
0.000 1
至少达到该震级的地震的年发生频率
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
震级

[illegible] **5–6B** [illegible] **–** [illegible]



[illegible] 5–6C [illegible]

[illegible] 9.1 [illegible] 9.1 [illegible] 13 000 [illegible]–[illegible]9.1 [illegible] 300 [illegible]

[illegible]

[illegible] 45 [illegible] 8 [illegible]–[illegible] 30 [illegible] 30 [illegible] 45 [illegible]

[illegible] 0.300 [illegible] 5:0[illegible] 7.0 [illegible]

[illegible] 2004 [illegible] 9 [illegible]

[illegible] 3 [illegible] 9 [illegible] 2004 [illegible] 9 [illegible] 3 [illegible] 9 [illegible] 7 [illegible] 2004 [illegible] 12 [illegible] 9.2 [illegible]

[illegible]–[illegible]–[illegible]

[illegible]

[illegible] 5–2B [illegible] 1964 [illegible] 10 [illegible] 5–6A [illegible]–[illegible]

[illegible] 9 [illegible] 9.5 [illegible] 10 [illegible] 1 000 [illegible] 10 [illegible]

[illegible]·[illegible]

[illegible] 3 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]2011 [illegible] 7 [illegible]“[illegible]”[illegible]

[illegible] 100~500 [illegible]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]

[illegible]–[illegible]·[illegible]·[illegible]

[illegible]·[illegible]2011 [illegible] 5.8 [illegible]185 [illegible] 2010 [illegible] 9 [illegible] 7.0 [illegible]

[illegible] GPS[illegible]

[illegible] 1 000 [illegible] 40 [illegible]

[illegible]

[1][illegible] · [illegible] 2012 [illegible]——[illegible]

[illegible]

[illegible] 2008 [illegible]

[illegible] 150 000 [illegible]2013 [illegible]GDP[illegible] 3%[illegible] 120 [illegible]

[illegible]

“[illegible] 9.2%[illegible]”

[illegible]2011 [illegible] 7 [illegible] 9 [illegible]

[illegible]“[illegible]”[illegible] 9.2%[illegible] 9.1%[illegible] 0.1%[illegible]

[illegible]“[illegible]”[illegible] 3 [illegible]——1990 [illegible] 2001 [illegible] 2007 [illegible]——[illegible]

[illegible]

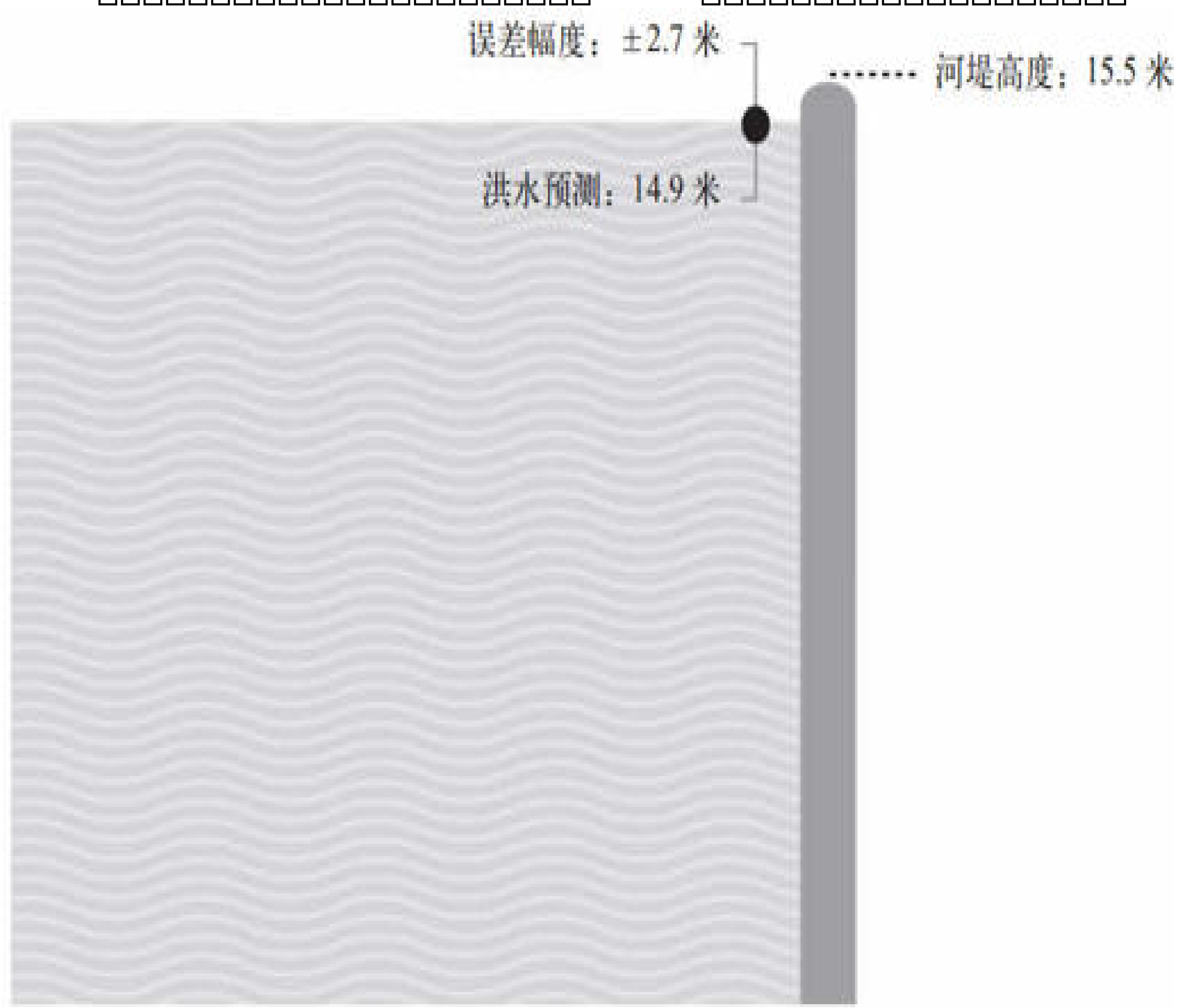
[illegible]——[illegible]

[illegible]

1997 [illegible] 4 [illegible] 3.2 [illegible] 5 [illegible] 75%[illegible]

[illegible]——[illegible]

[illegible] 14.9 [illegible]



6–1

[illegible] 1 [illegible] 14.9 [illegible]

[illegible]

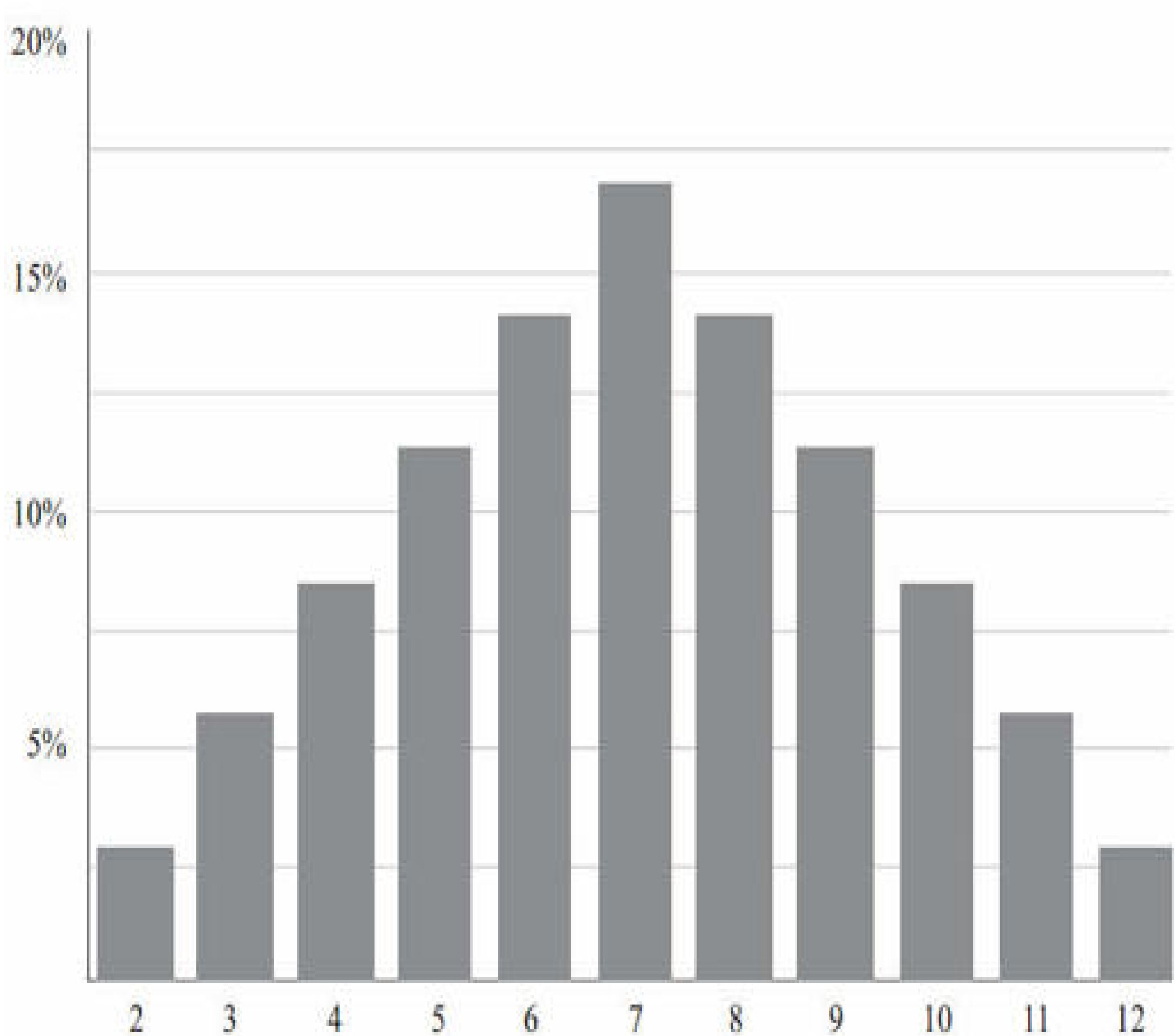
[illegible]

[illegible] 2007 [illegible] 11 [illegible] 1 [illegible]

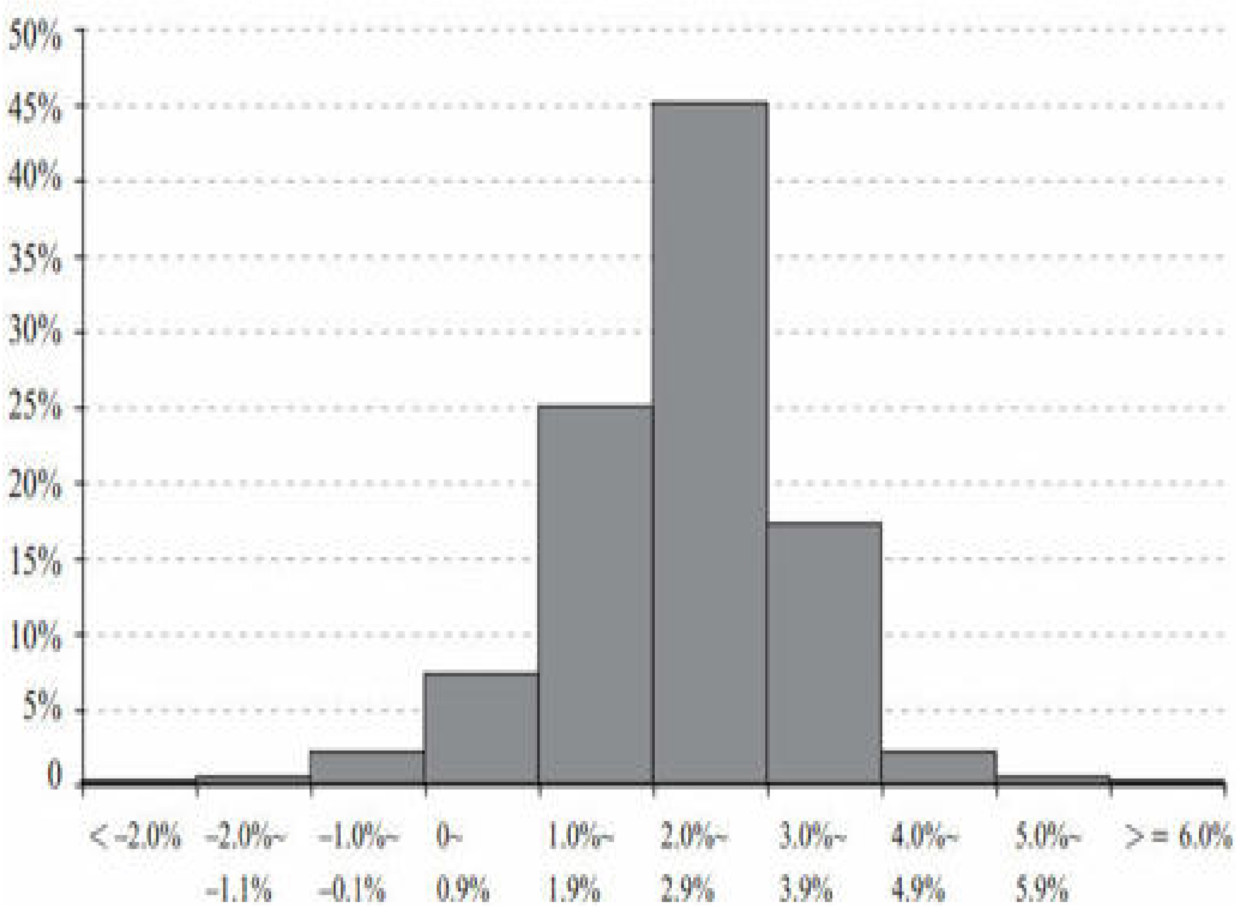
[illegible]“[illegible]”[illegible]“[illegible]”[illegible] 2008 [illegible] 2.4%[illegible]

[illegible]“[illegible]”[illegible] 6–2 [illegible] 7 [illegible] 2 [illegible] 12 [illegible]

“[illegible]”[illegible] GDP [illegible] GDP [illegible] 2%~3%[illegible] 3%~4%[illegible] 6–3 [illegible] 2007 [illegible] 11 [illegible] GDP [illegible]



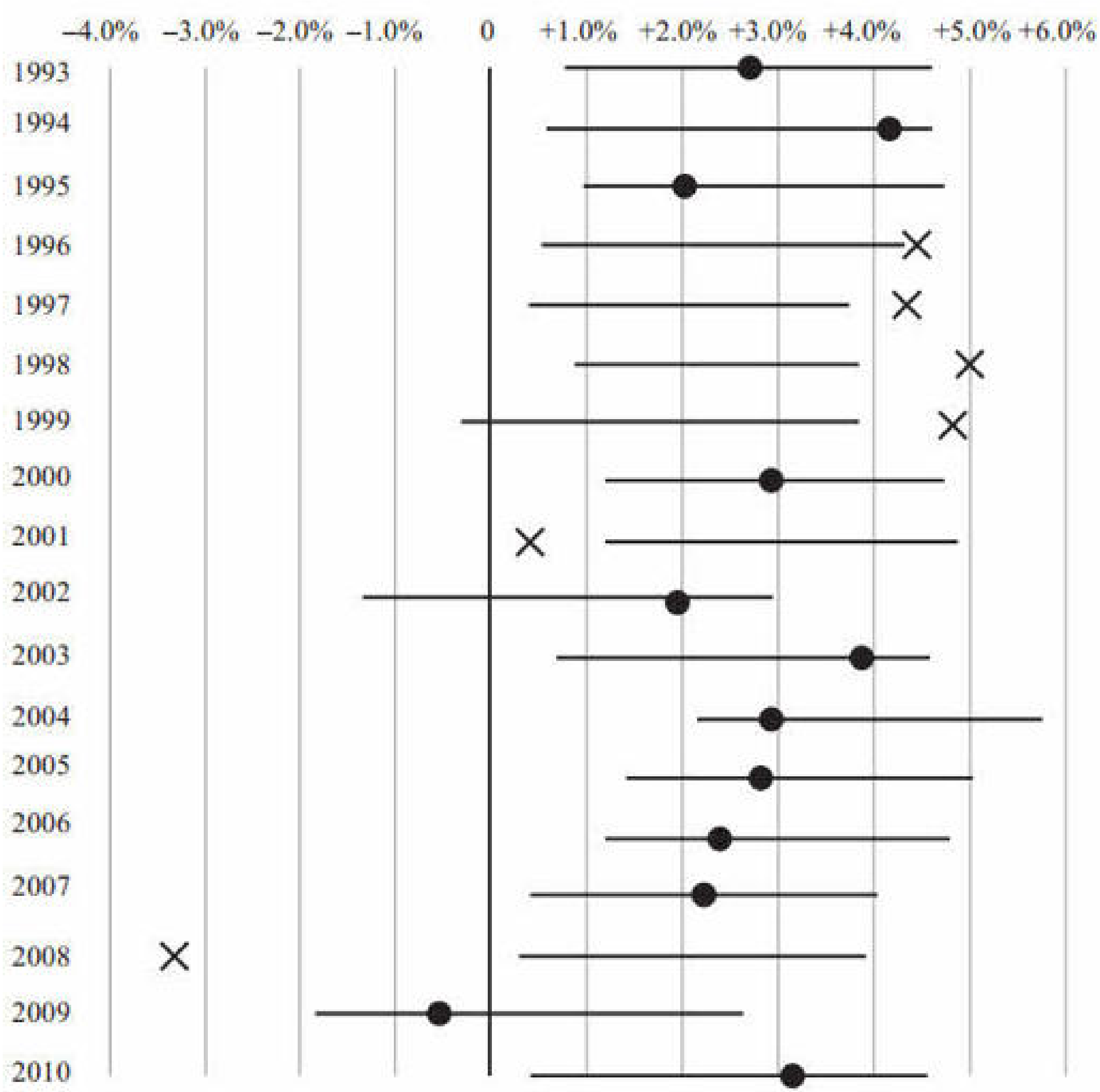
[illegible] **6–2** [illegible]



□ 6–3 □□□□□□□□□□□□□ GDP □□□□□□□□2008 □□

□□□□□□□□“□□”□□□□□□□□□□□2008 □ GDP □□□□□□ 2.4%□□□□□□□□□□□□□□□□□□□□□□□□2008 □□□□□□□□□□□□ GDP □□□□□□□□□□□□ 3.3%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ 2008 □□□□□□□□□□□□□□□□ 3%□GDP □□ 2%□□□□□□ 2‰□□□□□□□□ GDP □□□□ 2%□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ 6–4 □□□□□□1993~2010 □□ 18 □□□□“□□”□ GDP □□□□□□□□□□□□□□□□□□□□□□□□□□□□□ 90%□□□□



[illegible] 6–4 GDP [illegible]90% [illegible]·

[illegible]90%[illegible] 90%[illegible] 10%[illegible] GDP [illegible] 18 [illegible] GDP [illegible]

[illegible]GDP [illegible] 18 [illegible] 6 [illegible] 1/3[illegible] 1968 [illegible]“[illegible]”[illegible] GDP [illegible] 1/2 [illegible]

[illegible] GDP [illegible]90%[illegible] 6.4%[illegible] GDP [illegible]±3.2%[illegible]

[illegible] GDP [illegible] 2.5%[illegible] GDP [illegible] 5.7%[illegible] 0.7%——[illegible] 6 [illegible] 9 [illegible]20 [illegible] 90 [illegible] 60 [illegible]

[illegible]·[illegible]

[illegible] GDP [illegible] GDP [illegible] 1946 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]——[illegible]·[illegible]

[illegible]2007 [illegible] 11 [illegible]“[illegible]”[illegible]2009 [illegible] 1 [illegible] 2009 [illegible] 7.8%[illegible] 9.5%[illegible] 9.9%[illegible]

[illegible] 8 [illegible] 2005 [illegible]·[illegible]“[illegible]·[illegible]·[illegible]”[illegible]

[illegible]“[illegible]”

[illegible]

[illegible] 4.5 [illegible] 400 [illegible]“[illegible]”[illegible] 11 [illegible] 11 [illegible] 400 [illegible]——[illegible]——[illegible]

[illegible]“[illegible]”[illegible] 1967 [illegible] 1997 [illegible] 31 [illegible]NFL[illegible] 14%[illegible] 10%[illegible]

1997 [illegible] 31 [illegible] 28 [illegible]“[illegible]”[illegible] 470 [illegible]

[illegible]1998 [illegible] 28%[illegible]2008 [illegible]·[illegible] 35%[illegible] 1998 [illegible] 10%[illegible]

[illegible] 470 [illegible] 1.95 [illegible]GDP[illegible]

[illegible]——[illegible]——[illegible]“[illegible]”[illegible] 400 [illegible]

[illegible]2003 [illegible] 7 [illegible] 1990 [illegible] 2001 [illegible]——[illegible]——[illegible] 2007 [illegible] 2008 [illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible] 10 [illegible]“[illegible]”[illegible] 1984 [illegible] 3 [illegible] 6%[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”

[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

[illegible] 10%[illegible]

[illegible] 1976 [illegible]·[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

[illegible]

[illegible] GDP [illegible]“[illegible]”[illegible]1947~1999 [illegible] GDP [illegible] 1/2[illegible] GDP [illegible] 4%[illegible] 2%[illegible]

[illegible]——GDP [illegible]
2009 [illegible]GDP [illegible] 200 [illegible] 350 [illegible]

[illegible]·[illegible]GDP [illegible]“[illegible]”

[illegible]21 [illegible]——[illegible]1947~1999 [illegible] 50 [illegible] 15%[illegible] 1900~1945 [illegible] 45 [illegible] 36%[illegible]

[illegible] 1983~2006 [illegible] 3%[illegible]“[illegible]”[illegible]“[illegible]”[illegible]20 [illegible] 80 [illegible] 5%[illegible] 1%[illegible]

2007 [illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]FOMC[illegible] 2007 [illegible]FOMC [illegible] GDP [illegible] 2007 [illegible] 4 [illegible]

[illegible] FOMC [illegible] 2007 [illegible] 10 [illegible]“[illegible]”[illegible]FOMC [illegible]“[illegible]”[illegible]“[illegible]”[illegible]FOMC [illegible]

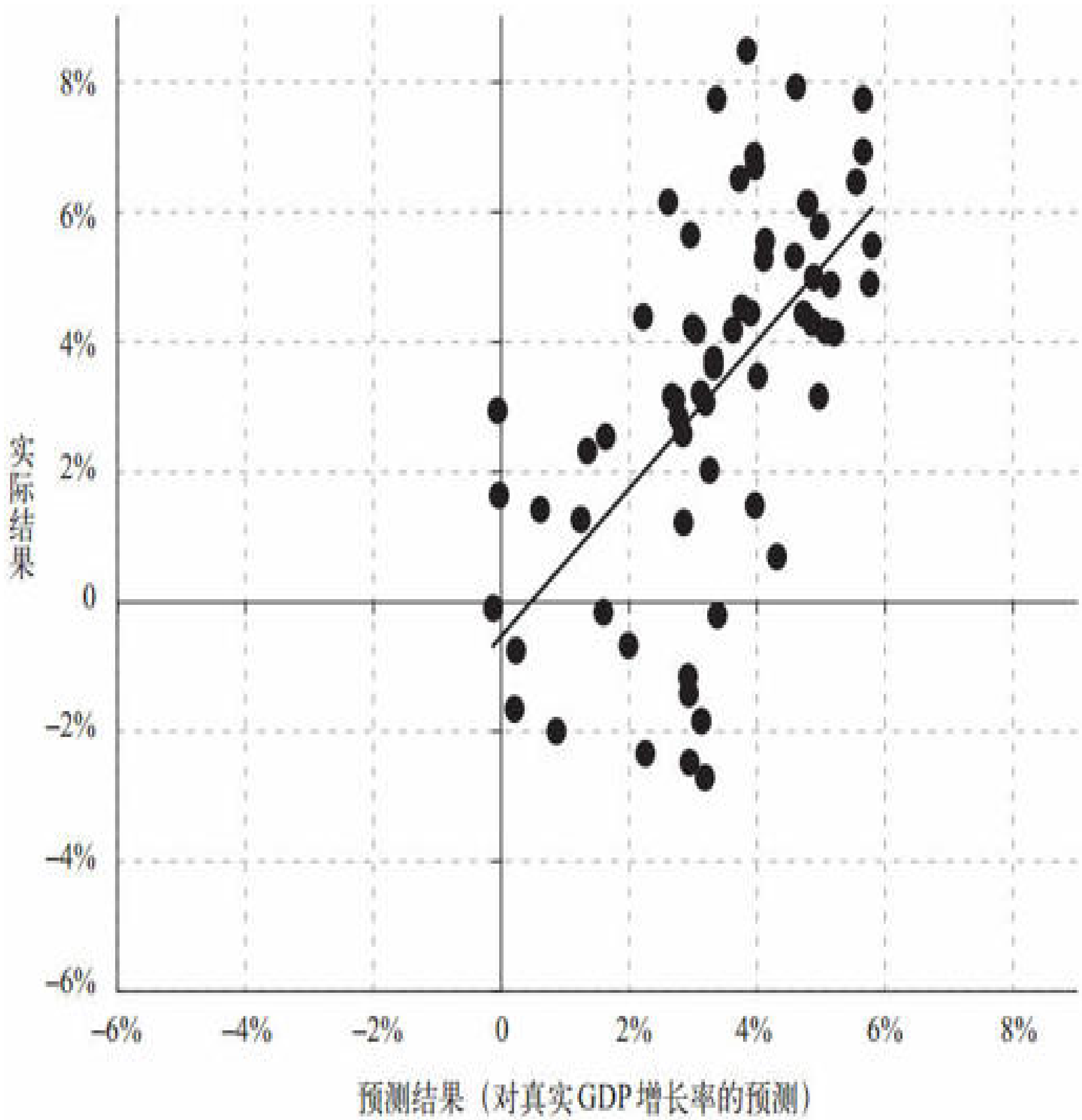
[illegible]FOMC [illegible]“[illegible]”[illegible] FOMC [illegible] 1986~2006 [illegible] 1990~1991 [illegible] 2001 [illegible]“[illegible] 20 [illegible] 80 [illegible]‘[illegible]’[illegible]”[illegible]FOMC [illegible] 2007 [illegible]

[illegible]——[illegible]

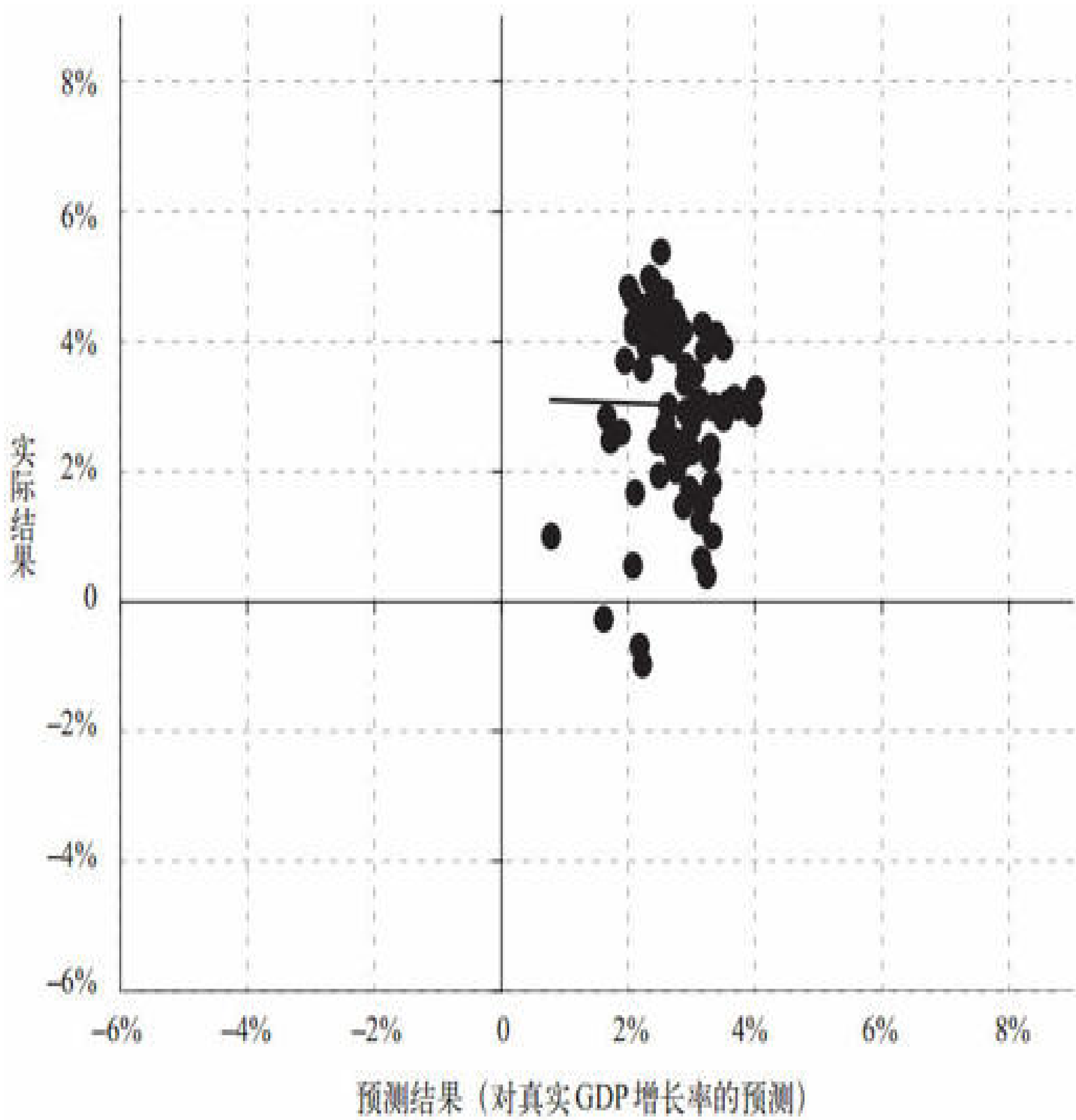
[illegible]

[illegible] 6–5A [illegible]“[illegible]”[illegible] GDP [illegible] 1968~1985 [illegible] FOMC [illegible] 20 [illegible] 70 [illegible] 80 [illegible]

[illegible] 1986~2006 [illegible] GDP [illegible] 6–5B[illegible] GDP [illegible] 2%~5%[illegible] 1990~1991 [illegible] 2001 [illegible]——[illegible]



□ 6–5A　1968~1985 □ GDP □□□□□□□ GDP □□□



[illegible] 6–5B 1986~2006 [illegible] GDP [illegible] GDP [illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]

[illegible]“[illegible]”

[illegible] 2008 [illegible] GDP [illegible] GDP“[illegible]”[illegible] 3.8%[illegible] 9%[illegible] 2009 [illegible] 1 [illegible]

[illegible]1965~2009 [illegible] GDP [illegible] 1.7%[illegible] GDP [illegible]±4.3%[illegible]1977 [illegible] 4 [illegible] 4.2%[illegible]–0.1%[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]“[illegible] 70%”[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] 2007 [illegible] 11 [illegible] 15 [illegible]

> [illegible]……[illegible] 2 000 [illegible] 2 [illegible]……[illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]——[illegible]ECRI[illegible]

2011 [illegible] 9 [illegible]ECRI [illegible]“[illegible]”[illegible]“[illegible]”[illegible]ECRI [illegible]“[illegible]”[illegible] ECRI [illegible]·[illegible]

> ECRI [illegible]

[illegible]ECRI [illegible] 2004 [illegible]“[illegible]”

[illegible]2011 [illegible] 9 [illegible] ECRI [illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]ECRI [illegible] ECRI [illegible] 5 [illegible] 21%[illegible]2011 [illegible] 4 [illegible] GDP [illegible] 3%[illegible]ECRI [illegible]“[illegible]”[illegible]
2012 [illegible]

[illegible]

[illegible]“[illegible]”[illegible] GDP [illegible] 20%[illegible]10%[illegible] 30%[illegible]

[illegible]

[illegible]·K·[illegible] 15%[illegible]20 [illegible]“[illegible]”[illegible]

[illegible]“[illegible]”

[illegible]

[illegible]“[illegible]”[illegible]——“[illegible]”——[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible] GDP [illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

[illegible]·[illegible]

[illegible]

[illegible]·[illegible]“[illegible]‘[illegible]’[illegible]‘[illegible]’[illegible]”

[illegible]“[illegible]”[illegible] 2011 [illegible] 11 [illegible]“[illegible]”[illegible] GDP [illegible] 6–6[illegible] 2007 [illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

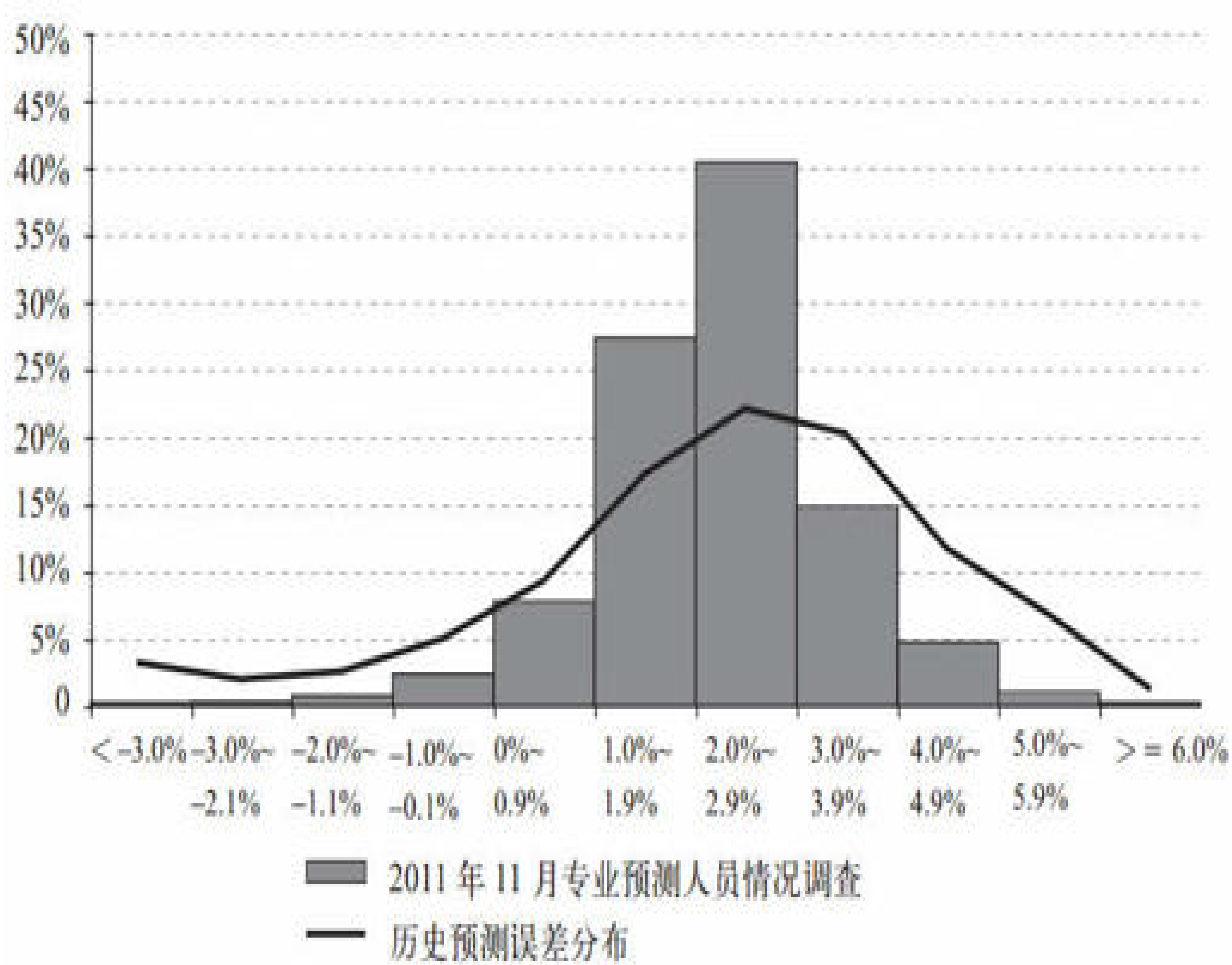

50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0
< −3.0%
−3.0%~ −2.1%
−2.0%~ −1.1%
−1.0%~ −0.1%
0%~ 0.9%
1.0%~ 1.9%
2.0%~ 2.9%
3.0%~ 3.9%
4.0%~ 4.9%
5.0%~ 5.9%
>= 6.0%
2011 年 11 月专业预测人员情况调查
历史预测误差分布

图 6–6 [illegible] **GDP** [illegible] **2012** [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]—[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]

[illegible] GDP [illegible] GDP [illegible]

[illegible] GDP [illegible] GDP [illegible] 5%[illegible] 2%[illegible]

[illegible]——[illegible]
GDP [illegible]

[illegible]

[illegible]

[illegible]

[illegible] 1 [illegible]

[illegible]·[illegible] 19 [illegible] 1976 [illegible] 1 [illegible] 80 [illegible]1976 [illegible]“[illegible]”[illegible]

[illegible] 21 [illegible]

[illegible]

[illegible]“[illegible]”[illegible] H1N1 [illegible]H1N1 [illegible]1918~1920 [illegible] 1/3 [illegible]5 [illegible] 67.5 [illegible]1918 [illegible] 1976 [illegible]——[illegible]——[illegible] 10 [illegible] 1938 [illegible]1947 [illegible]1957 [illegible] 1968 [illegible]1976 [illegible]

[illegible] H1N1 [illegible] H1N1 [illegible] 1918 [illegible]·[illegible] F·[illegible]·[illegible] 100 [illegible]1918 [illegible]“[illegible]”[illegible]

[illegible] 6 [illegible] H1N1 [illegible]——[illegible]·[illegible]“[illegible]”[illegible] 20 [illegible] 50 [illegible]·[illegible]

[illegible] 1.8 [illegible]

[illegible] H1N1 [illegible] H1N1 [illegible] 200 [illegible] H1N1 [illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]:“[illegible] 55 [illegible]”[illegible]——“[illegible]……[illegible]……[illegible]”

[illegible]1976 [illegible] 8 [illegible] 50%[illegible] 80%[illegible]

[illegible] 1976 [illegible] 10 [illegible]10 [illegible] 11 [illegible] 3 [illegible]·[illegible]

[illegible] 500 [illegible]·[illegible]·[illegible]

[illegible]·[illegible] 10 [illegible] 5 000 [illegible] 500 [illegible]·[illegible] 12 [illegible] 16 [illegible]

[illegible] H1N1 [illegible] 1976~1977 [illegible] H1N1 [illegible]

[illegible]——H1N1 [illegible] 1976 [illegible] 11 [illegible]·[illegible] 26 [illegible]·[illegible] 100 [illegible] 1978 [illegible] 1979 [illegible]

[illegible] H1N1 [illegible] 1918 [illegible] 35%[illegible] 2%[illegible]

[illegible] H1N1 [illegible]33 [illegible] H1N1 [illegible]2009 [illegible] H1N1 [illegible]

[illegible] H1N1 [illegible]

[illegible]

[illegible] 3 [illegible] H1N1 [illegible]

1.[illegible]

2.[illegible]

3.[illegible]

[illegible] 3 [illegible] 1/2[illegible]

[illegible]H5N1 [illegible]

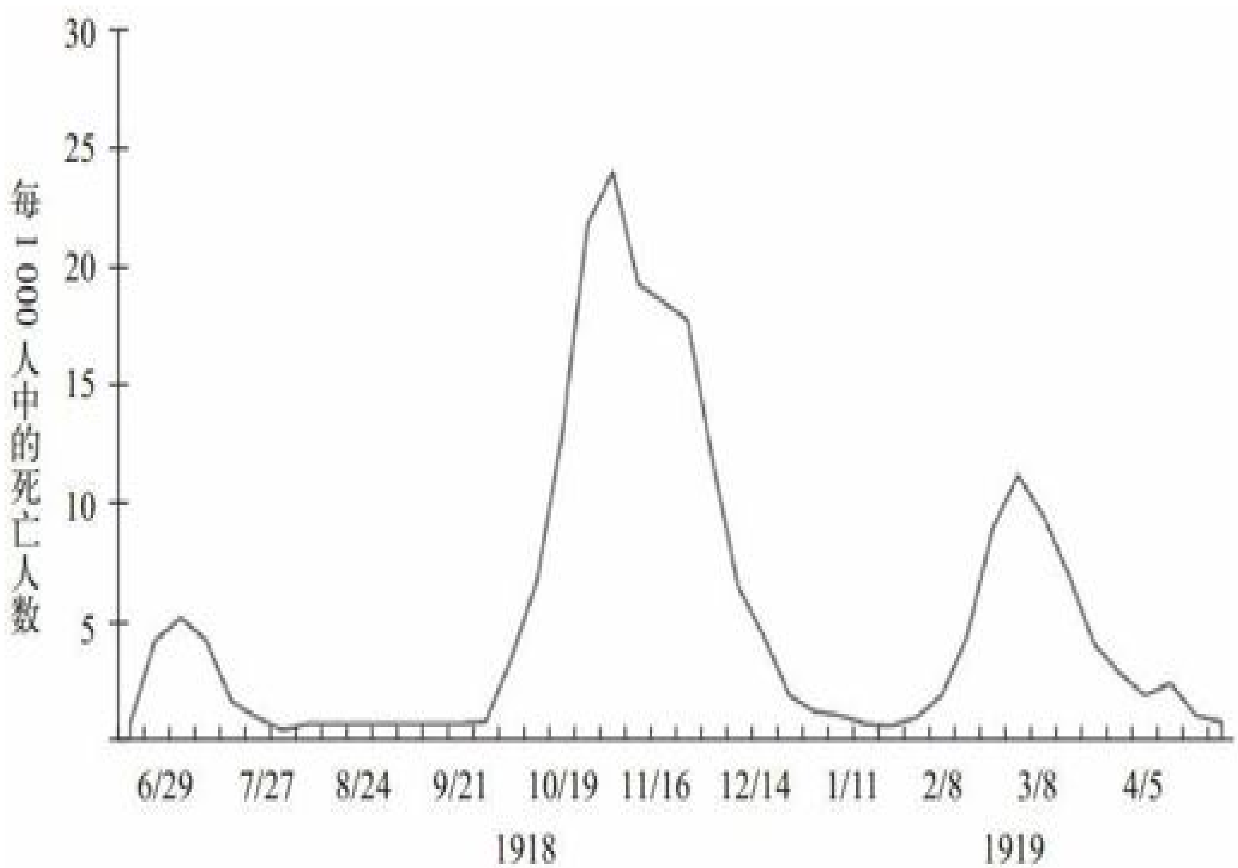
[illegible]2009 [illegible] H1N1 [illegible]

2009 [illegible] 4 [illegible] H1N1 [illegible] 1 900 [illegible] H1N1 [illegible] 150 [illegible] 8%[illegible]

H1N1 [illegible] H5N1[illegible]

[illegible] H1N1 [illegible]——2009 [illegible] 4 [illegible] 26 [illegible] 20 [illegible]15 [illegible] 2 618 [illegible] 3 [illegible]

[illegible]2009 [illegible] 6 [illegible] 6 [illegible] 1918 [illegible] 2 [illegible] 3 [illegible] 7–1[illegible]2009 [illegible] 8 [illegible] 1/2 [illegible] H1N1 [illegible] 9 [illegible]



[illegible] 7–1 1918~1919 [illegible] H1N1 [illegible]

[illegible] 2009 [illegible] H1N1 [illegible] 5.5 [illegible] 1/6[illegible] 1/2[illegible] 11 000 [illegible] H1N1 [illegible] 0.02%[illegible]2009 [illegible] 1976 [illegible]

[illegible]

[illegible]——[illegible]

[illegible]

[illegible]19 [illegible] 20 [illegible]1894 [illegible] 20 [illegible] 40 [illegible] 2.7 [illegible] 10 [illegible]·[illegible] T [illegible]

[illegible]1682 [illegible]·[illegible] 17 [illegible]

[illegible] 2012 [illegible] 7 [illegible] 2011 [illegible] 70 [illegible] 10 [illegible]

[illegible]·R·[illegible]·[illegible] 1968 [illegible] 20 [illegible] 70 [illegible] 20 [illegible] 60 [illegible]“[illegible]”[illegible] 20 [illegible]

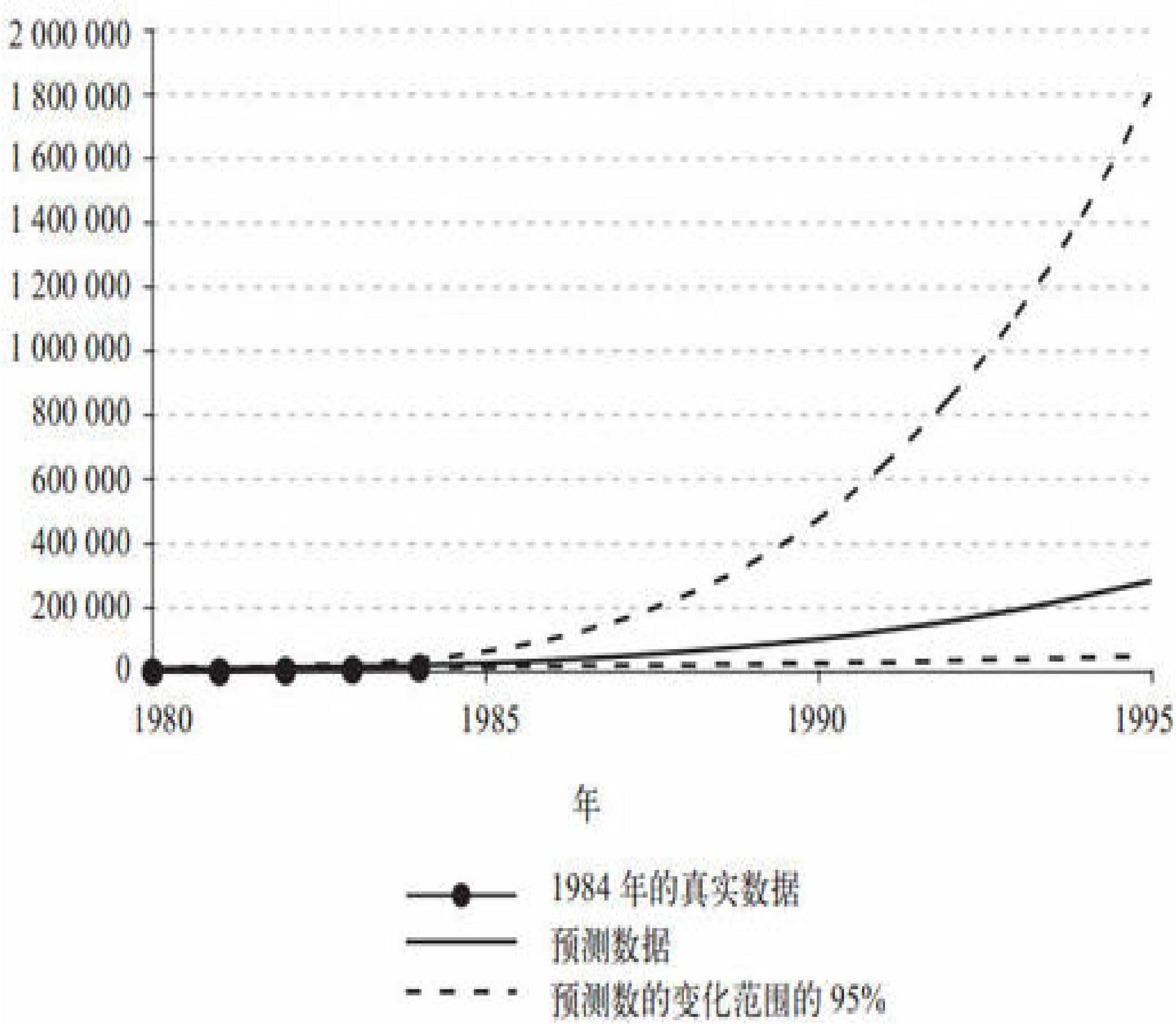
[illegible]——[illegible]——[illegible] 20 [illegible] 80 [illegible] 1980 [illegible] 99 [illegible] 1981 [illegible] 434 [illegible] 1984 [illegible] 11 148 [illegible]——[illegible] 1995 [illegible] 270 000 [illegible] 1995 [illegible] 560 000 [illegible]

[illegible] 1995 [illegible] 35 000 [illegible] 180 [illegible]

[illegible] 2009 [illegible]

[illegible]

[illegible] R0[illegible] R0=4[illegible] 4 [illegible]



□ 7–2 □□□□□□□□□□□□□□1984~1995 □□□□□□□□□□□□□□□□□□□□□□

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□ 7–1 □□□□□ Ro □□□□□□□

□□	150
□□	15

[illegible]	6
[illegible]	3.5
[illegible]	3.5
1918 [illegible] H1N1 [illegible]	3
1995 [illegible]	1.8
2009 [illegible] H1N1 [illegible]	1.5
[illegible]	1.3

[illegible]——[illegible]

[illegible] 2009 [illegible] H1N1 [illegible] H1N1 [illegible] H1N1 [illegible]

[illegible] H1N1[illegible] H1N1 [illegible] 1/4 [illegible]H1N1 [illegible]“[illegible]”[illegible]H1N1 [illegible]

[illegible]H1N1 [illegible]2009 [illegible] 3 [illegible] H3N2 [illegible]

[illegible]H1N1 [illegible] H1N1 [illegible]

[illegible]

[illegible]

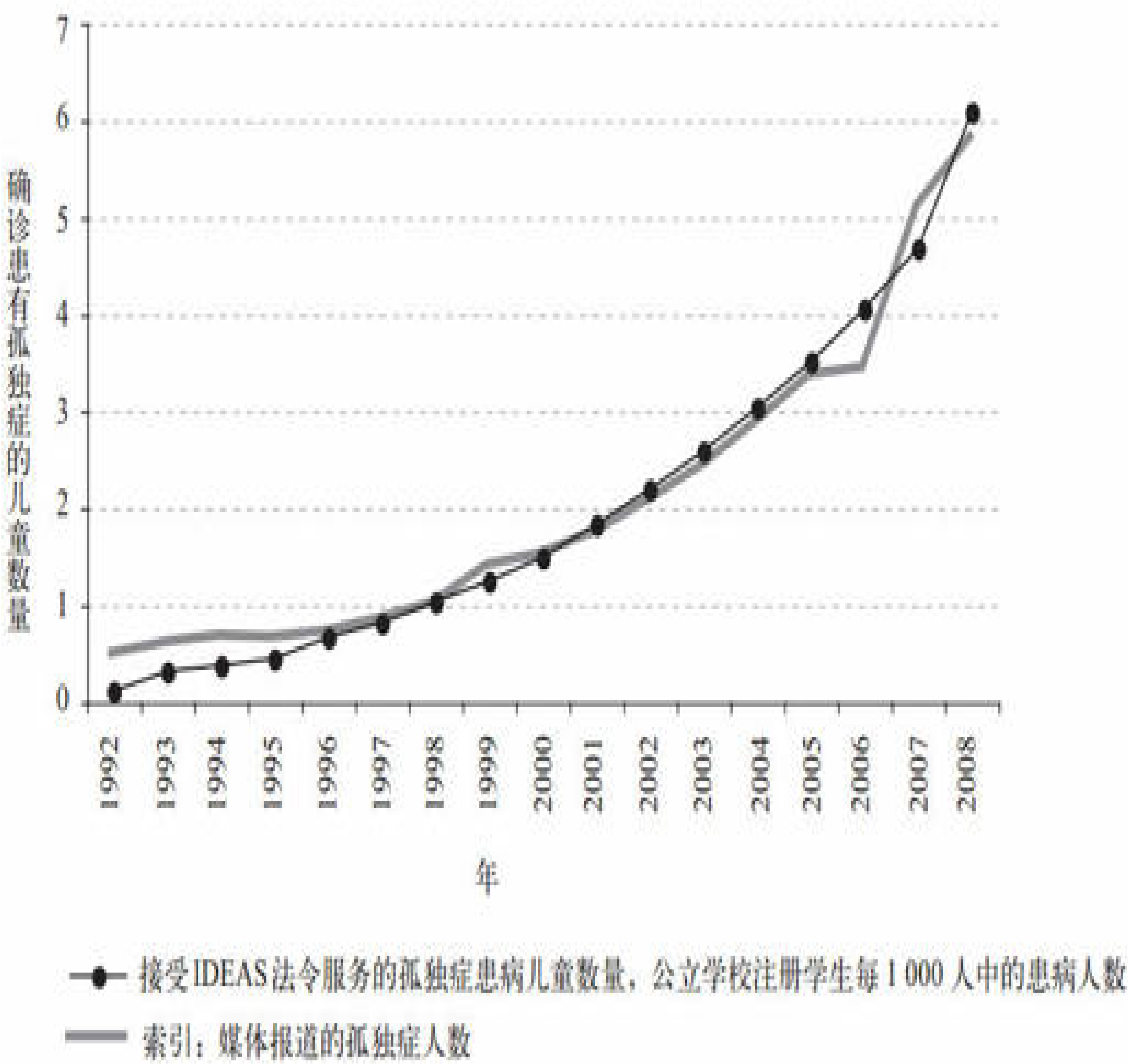
[illegible]2012 [illegible]CNN[illegible]·[illegible] 16%[illegible] 10%[illegible]——[illegible]CNN [illegible]·[illegible]·[illegible]

[illegible]——[illegible]——[illegible]“[illegible]”[illegible]

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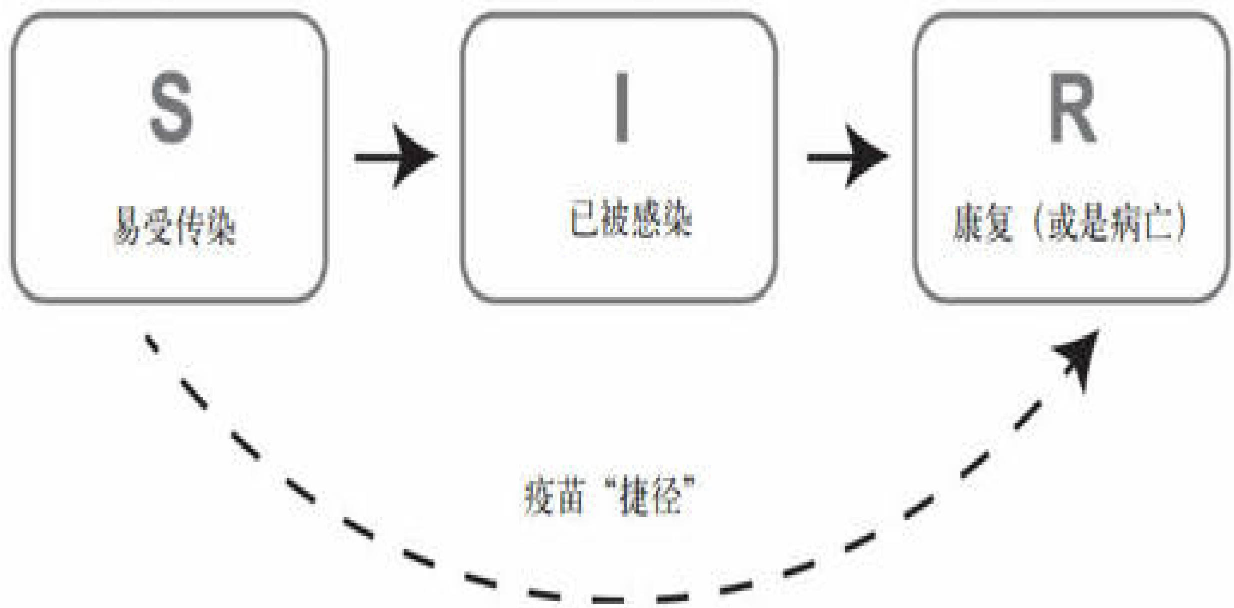
[illegible] 2009 [illegible] H1N1 [illegible]



[illegible] 7–3 [illegible]1992~2008 [illegible]

[illegible]

[illegible] GPS [illegible] GPS [illegible]


S
易受传染
I
已被感染
R
康复（或是病亡）
疫苗“捷径”

20 [illegible] 90 [illegible] 21 [illegible] 20 [illegible]/[illegible]——“[illegible]”[illegible]HIV [illegible]——20 [illegible] 80 [illegible]

[illegible]HIV [illegible]

[illegible] HIV [illegible]MSM[illegible]——20 [illegible] 90 [illegible]——[illegible]1998 [illegible] 9 [illegible] 2004 [illegible] 502 [illegible]2004 [illegible],[illegible] HIV [illegible] HIV [illegible]

[illegible]“[illegible]”[illegible] HIV [illegible]“[illegible]”[illegible]“[illegible]”[illegible] HIV [illegible]

[illegible]——[illegible] HIV [illegible]SIR [illegible]SIR [illegible] HIV [illegible]

[illegible]·[illegible]“[illegible]”[illegible] SIR [illegible]

20 [illegible] 80 [illegible] 90 [illegible]“[illegible]”——[illegible]“[illegible]”[illegible]20 [illegible] 80 [illegible]

[illegible]·[illegible]

[illegible] 2010 [illegible]

[illegible] 13 [illegible] MMR[illegible] SIR [illegible]

[illegible] 1976 [illegible] H1N1 [illegible] H1N1 [illegible] H1N1 ——[illegible] A/[illegible]/76——[illegible] 230 [illegible]——[illegible] 1918 [illegible] R0 [illegible] 3[illegible]

[illegible]——[illegible]——[illegible]

[illegible] A/[illegible]/76 [illegible] R0 [illegible] 1.2[illegible]

A/[illegible]/76 [illegible] HIV [illegible] 20 [illegible] 80 [illegible]

[illegible]SIR [illegible]

[illegible]

[illegible]

[illegible]“[illegible] Agent [illegible]”[illegible] FRED [illegible] framework for the reconstruction of epidemic dynamics [illegible]·[illegible]

[illegible] FERD [illegible]——[illegible]“[illegible]”[illegible]“[illegible]

[illegible]”[illegible]

[illegible]·[illegible] FERD [illegible]“[illegible]——[illegible]”

[illegible]·[illegible] FRED [illegible]FRED [illegible]“[illegible]”[illegible] Agent [illegible]

[illegible] 26 [illegible]——[illegible] Agent [illegible]

[illegible] H1N1 [illegible] Agent [illegible]

[illegible] Agent [illegible] MRSA[illegible]MRSA [illegible] MRSA [illegible] MRSA [illegible] MRSA [illegible]

[illegible] MRSA [illegible]

[illegible] Agent [illegible]——[illegible] Agent [illegible] HIV [illegible]

[illegible] Agent [illegible] "[illegible] H1N1 [illegible]" [illegible] "[illegible]"

[illegible] —— [illegible] —— [illegible] —— [illegible] MRSA [illegible]

[illegible] Agent [illegible] —— [illegible] —— [illegible] —— [illegible] —— [illegible]

[illegible] 2009 [illegible] H1N1 [illegible] H1N1 [illegible]

[illegible] · [illegible] "[illegible]" [illegible] Agent [illegible]

[illegible]

[illegible] 1976 [illegible] H1N1 [illegible] "[illegible]" [illegible] 2009 [illegible] H1N1 [illegible]

[illegible] H5N1 [illegible] 2009 [illegible] H1N1 [illegible] 1918 [illegible] 140 [illegible] SARS [illegible] 1977 [illegible] 2009 [illegible] H1N1 [illegible]

[illegible] · [illegible] "[illegible] 3 [illegible]" [illegible] "3 [illegible]" [illegible] 1918 [illegible] 1957 [illegible] 1968 [illegible] 3 [illegible] "[illegible]" [illegible]

[illegible]

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[illegible]·[illegible]“[illegible]”[illegible]

[illegible]·E·P·[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]

[illegible] Agent [illegible]

[illegible]“[illegible]”[illegible]“[illegible]”

[illegible]·[illegible]

[illegible]

[illegible]

[illegible]

[illegible]NBA[illegible]“[illegible]”[illegible]·[illegible]·[illegible]·[illegible] 11 [illegible] 6 [illegible] NBA[illegible] 5 [illegible] 5 [illegible]“[illegible]”[illegible] 100 [illegible]

[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

[illegible] 145 [illegible] 300 [illegible] 12 [illegible] 16 [illegible] 7 [illegible]

[illegible]1999 [illegible] 8 [illegible]

[illegible]8 [illegible]

[illegible]·[illegible]·[illegible] 6 [illegible] NBA [illegible] 2.13 [illegible]“[illegible]”[illegible]·[illegible]21 [illegible]·[illegible]4 [illegible]——“[illegible]”[illegible]“[illegible]”[illegible]——[illegible] NBA [illegible]“[illegible]”[illegible]

“ ” 1998~1999 31:19
4 “ ”
21 “ ”

NBA 7
—— 4:1 NBA

1999~2000
6.5:1

——
7
5 1998~1999
1997~1998
61:21 8
NBA
50

71 82
62 3 —— 19 16
11 67 15 NBA

4

2001

· ·

20
77:106

[illegible] 13 [illegible]·[illegible] 9 [illegible] 11 [illegible] 3:1[illegible]“[illegible]”[illegible]

[illegible] 79 [illegible] 30 [illegible] 88:96 [illegible] 103:93 [illegible]

[illegible] 8 [illegible] 20 [illegible] 2:3 [illegible] 8 [illegible] 22 [illegible] 2:3 [illegible] 8 [illegible] 20 [illegible] 32 [illegible] 50 [illegible]

[illegible] 20 [illegible] 23 [illegible]

[illegible] 6 [illegible] 3 [illegible] 3 [illegible] 16 [illegible]

[illegible] 16 [illegible] 15:1[illegible]——[illegible]——[illegible]

[illegible]

[illegible] 6 [illegible] 5 [illegible] 3 [illegible]·[illegible] 3 [illegible]

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[illegible]

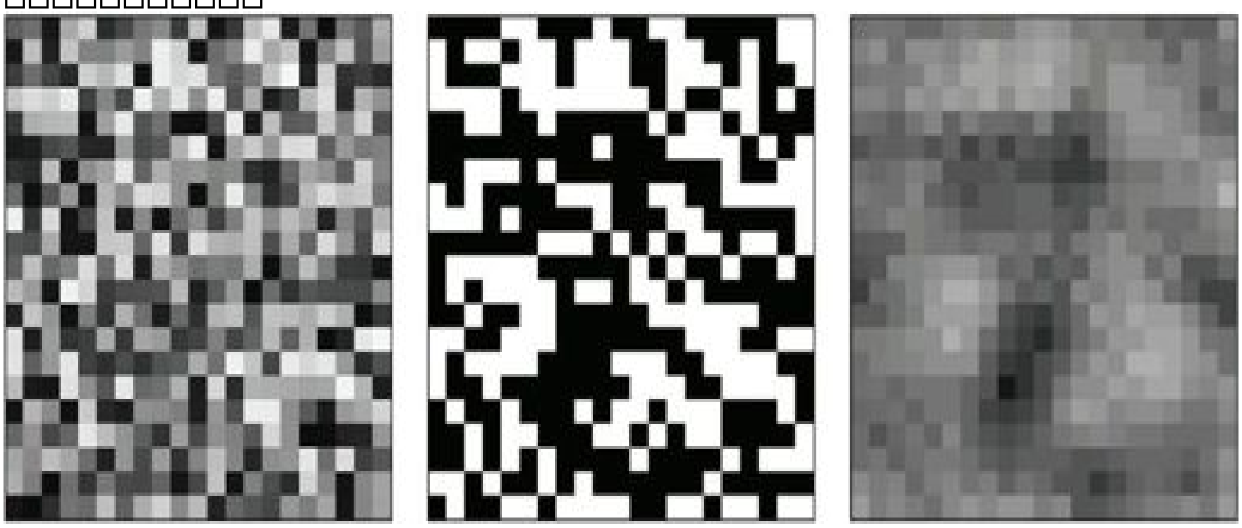
[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible] 13%[illegible] NBA [illegible] 100%[illegible] 13%[illegible] 25%[illegible] 7 [illegible]

[illegible] 8–1 [illegible]

[illegible]	[illegible]	[illegible]
[illegible]	25%	+520 000 [illegible]
[illegible]	75%	–80 000 [illegible]
[illegible]	+70 000 [illegible]	

[illegible]“[illegible]”[illegible] 25%[illegible] 52 [illegible] 75%[illegible] 8 [illegible] 7 [illegible]“[illegible]”[illegible] 6 [illegible]



[illegible] 8–1 [illegible]

[illegible] NBA [illegible]

[illegible] 2.19 [illegible]·[illegible] 3 [illegible]

[illegible] NBA [illegible]——[illegible]——[illegible] NBA [illegible] NBA [illegible] 140 [illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]

[illegible]2002 [illegible]·[illegible]·[illegible] 3 [illegible] 192 [illegible] 207 [illegible]

[illegible] NBA [illegible]30 [illegible] 82 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]·[illegible] 1701 [illegible] 1702 [illegible]——[illegible]——[illegible]

[illegible]

[illegible]·[illegible]“[illegible]……[illegible]”

[illegible] 1763 [illegible]·[illegible]

[illegible]“[illegible]”[illegible] 100%[illegible] 100%[illegible]

[illegible]

[illegible]·[illegible]

[illegible]

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[illegible]

[illegible]

18 [illegible] 20 [illegible]

[illegible]

[illegible] 3 [illegible]

[illegible]

[illegible]——[illegible] 3 [illegible]

> [illegible] 50%[illegible]

> [illegible] 5%[illegible]

> [illegible] 4%[illegible]

[illegible] 3 [illegible] 8–2[illegible]

[illegible] 29%[illegible]——[illegible]

[illegible] 8–2 [illegible]——[illegible]

[illegible]		
[illegible]	x	4%
[illegible]		
[illegible]	y	50%
[illegible]	z	5%
[illegible]		
[illegible]	xy xy [illegible] z[illegible]1 [illegible] x[illegible]	29%

[illegible] 40 [illegible] 40 [illegible] 1.4%[illegible] X [illegible]

[illegible] X [illegible] 10%[illegible]X [illegible] 75%[illegible] X [illegible]40 [illegible] X [illegible] 10%[illegible] 50 [illegible] X [illegible]

[illegible] 3%[illegible] 8–2 [illegible] X [illegible]



[illegible] 8–2 [illegible]——[illegible] X [illegible]

[illegible]·[illegible] 1/4 [illegible] 1/6.5[illegible]

[illegible] 100%[illegible]

[illegible]“9·11”[illegible]2001 [illegible] 9 [illegible] 11 [illegible]

[illegible] 1:20 000 [illegible] 0.005%[illegible]

□□□□□□□□□□□□□ 0.005%□□□□□9 □ 11 □□□□ 25 000 □□ 1945 □□□□□□□□□□□□□□□□ 1946 □□□□□□□□□□□□□□□□□□□□□□□□□□□□□ 1:12 500□□□ 8–3A□□□□□□□□□□□□□□□ 0.005%□□□ 38%□

□ **8–3A** □□□□□**——**□□□□□□□□□

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□□□□□□□□□□□□□□□□□□□□□□□□□	x	0.005%
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□□ 38%□□ 99.999%□□□

□ **8–3** □□□□□**——**□□□□□□□□□

□□□□		
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□	x	38 %
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□□□□		

[illegible]	x y xy [illegible] z[illegible]1 [illegible] x[illegible]	99.99 %

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]

[illegible] X [illegible]“[illegible]”[illegible] 2005 [illegible]“[illegible]”[illegible]

[illegible] 2/3 [illegible]

[illegible]“[illegible] 20 [illegible]”

[illegible] 45 000 [illegible] 10 [illegible]

[illegible]——[illegible]——[illegible]

[illegible] 8–3 [illegible]80%[illegible]“[illegible]”[illegible] 90%[illegible] 2/3 [illegible]

[illegible] 8–3 [illegible]

[illegible]



正确假设（100/1 000）
肯定的统计学检验（正确的判断）（80/100）
否定的统计学检验（错误的判断）（20/100）
错误假设（900/1 000）
肯定的统计学检验（错误的判断）（180/900）
否定的统计学检验（正确的判断）（720/900）

[illegible] **8–3** [illegible]

[illegible]

[illegible]·[illegible]·[illegible]·[illegible] 120 [illegible]1890 [illegible]·[illegible] 8 [illegible]

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[illegible]“[illegible]”[illegible]

“[illegible]”[illegible] 800 [illegible] 800 [illegible] 800 [illegible] 800 [illegible]“[illegible]”[illegible]

[illegible]2008 [illegible] 15 000 [illegible]——[illegible]±0.8%[illegible] 8%[illegible] 8 [illegible] 3 [illegible]——[illegible]“[illegible]”[illegible]——[illegible]

[illegible] 2 [illegible] 250 [illegible]

[illegible]“[illegible]”[illegible]——[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“9·11”[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]

[illegible]20 [illegible] 50 [illegible]

[illegible]

[illegible] 20 [illegible] 50 [illegible]——[illegible]

[illegible]

[illegible]——[illegible]

[illegible]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”

[illegible] 54%[illegible]“[illegible]”[illegible] 57%[illegible]

[illegible] 53%[illegible] 56%[illegible]“[illegible]”[illegible]

[illegible]

[illegible] 8–4 [illegible]

[illegible] 8–4 [illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]1[illegible]2[illegible]
[illegible]	[illegible]

[illegible]“[illegible]”[illegible] 70%[illegible] 50%[illegible] 1999 [illegible]

[illegible]

[illegible]

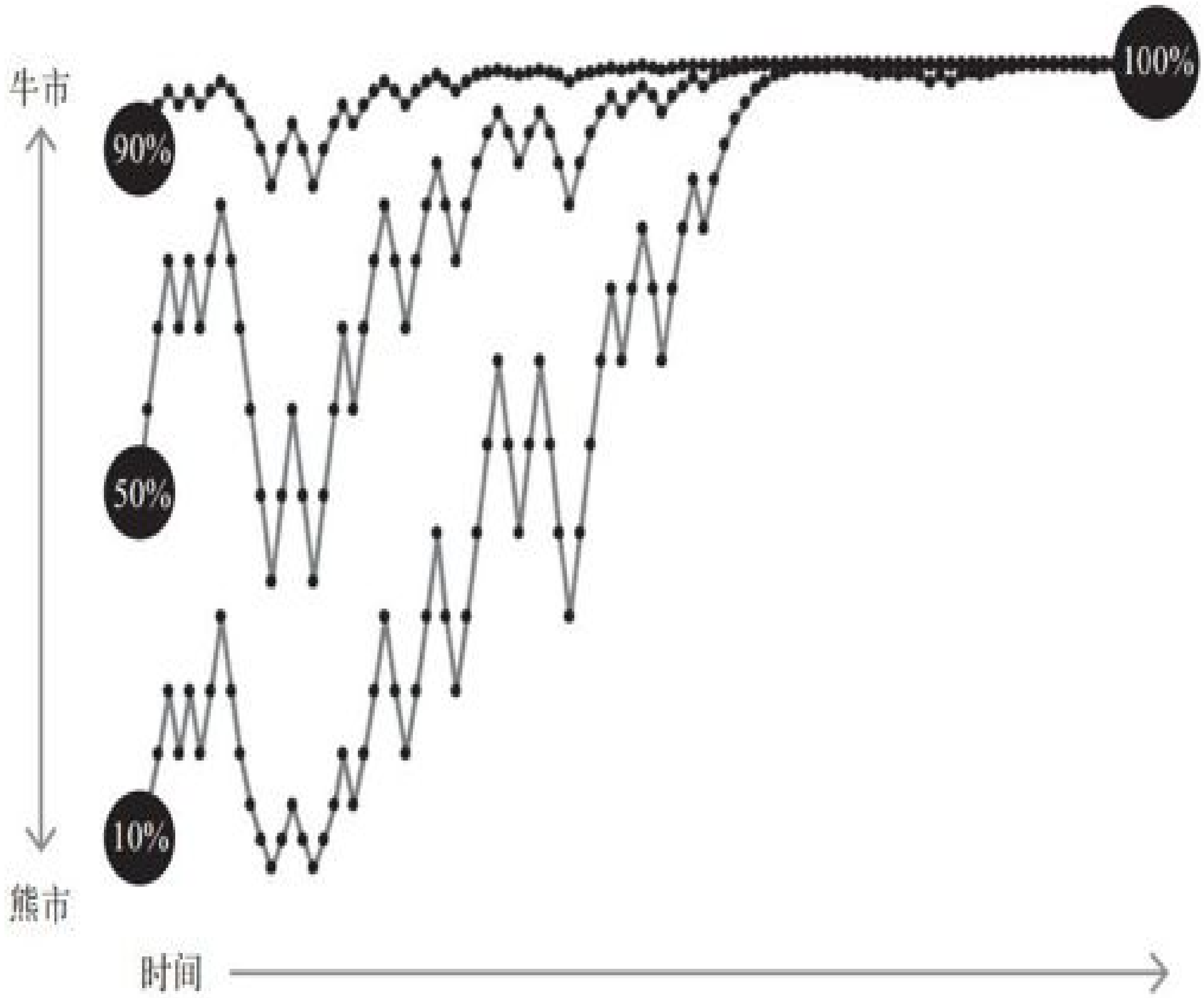
[illegible] 0.000 01%[illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]

[illegible] 8–4 [illegible]3 [illegible]——[illegible] 90%[illegible] 10%[illegible] 60%[illegible] 3 [illegible]



[illegible] 8-4 [illegible]

[illegible]

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[illegible]“[illegible]”[illegible] 10 [illegible]

[illegible]

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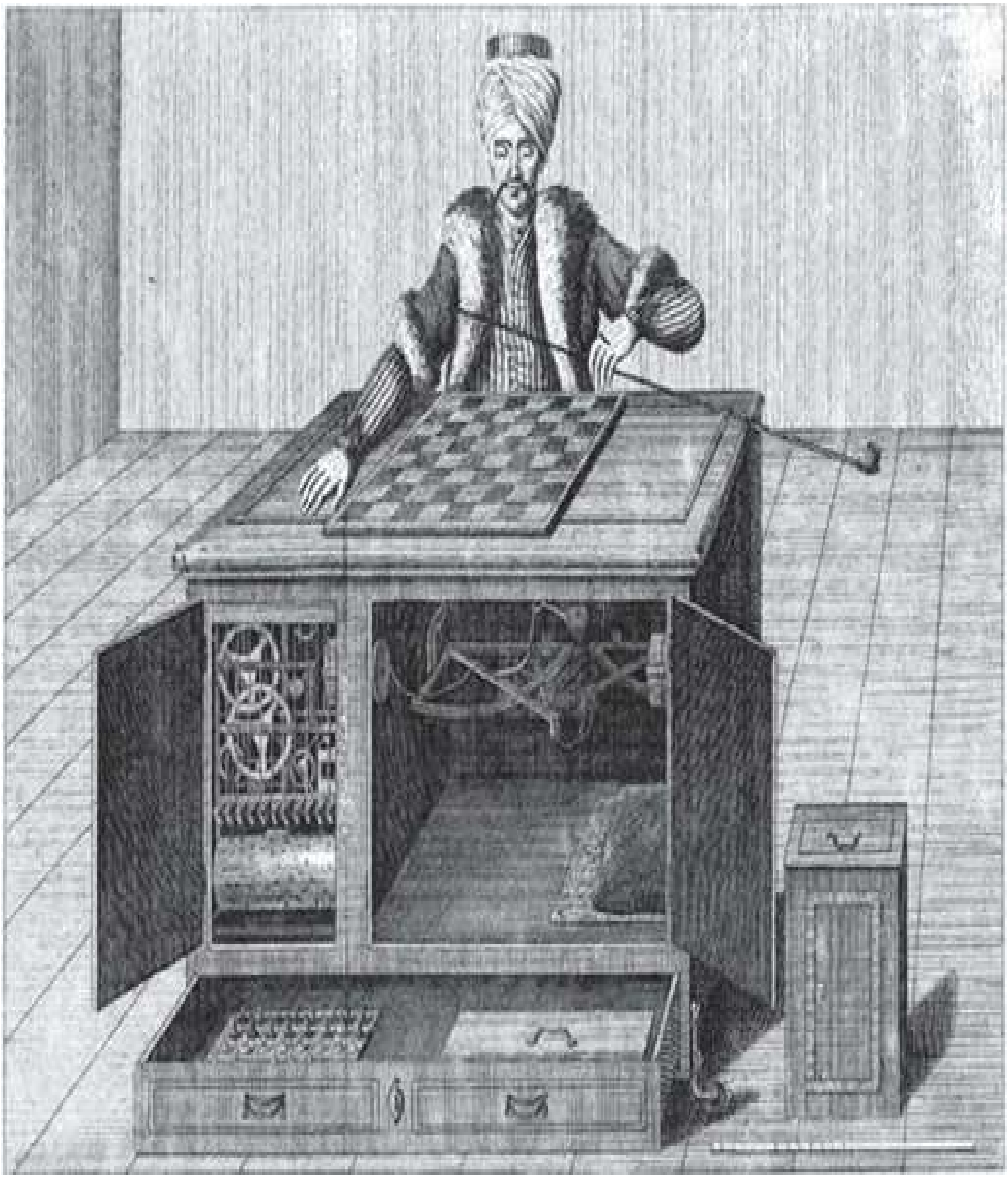
[illegible]

[illegible]24 [illegible]·[illegible]·[illegible]·[illegible]·[illegible]1770 [illegible]·[illegible]19 [illegible] 30 [illegible]·[illegible]——[illegible]“[illegible]”[illegible]

[illegible]·[illegible]“[illegible]”[illegible]·[illegible]·[illegible]·[illegible]

[illegible]·[illegible] 120 [illegible]·[illegible]

[illegible]·[illegible]“[illegible]”[illegible]——[illegible]·[illegible]——[illegible]·[illegible]



[illegible] 9–1 [illegible]

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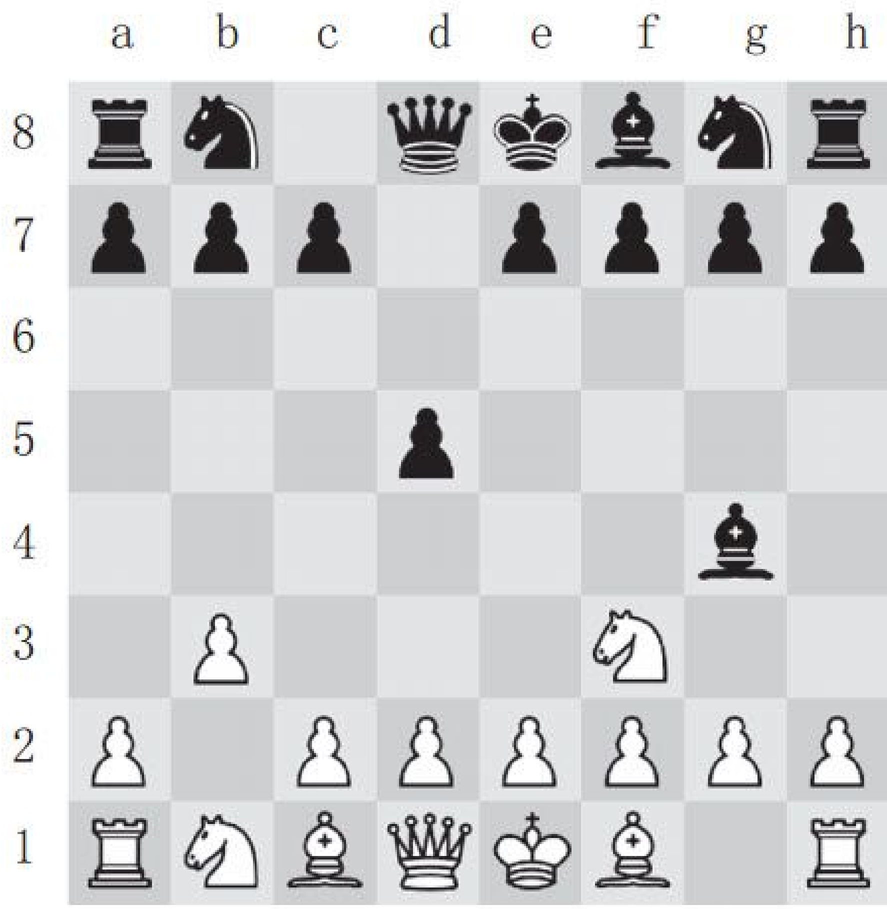
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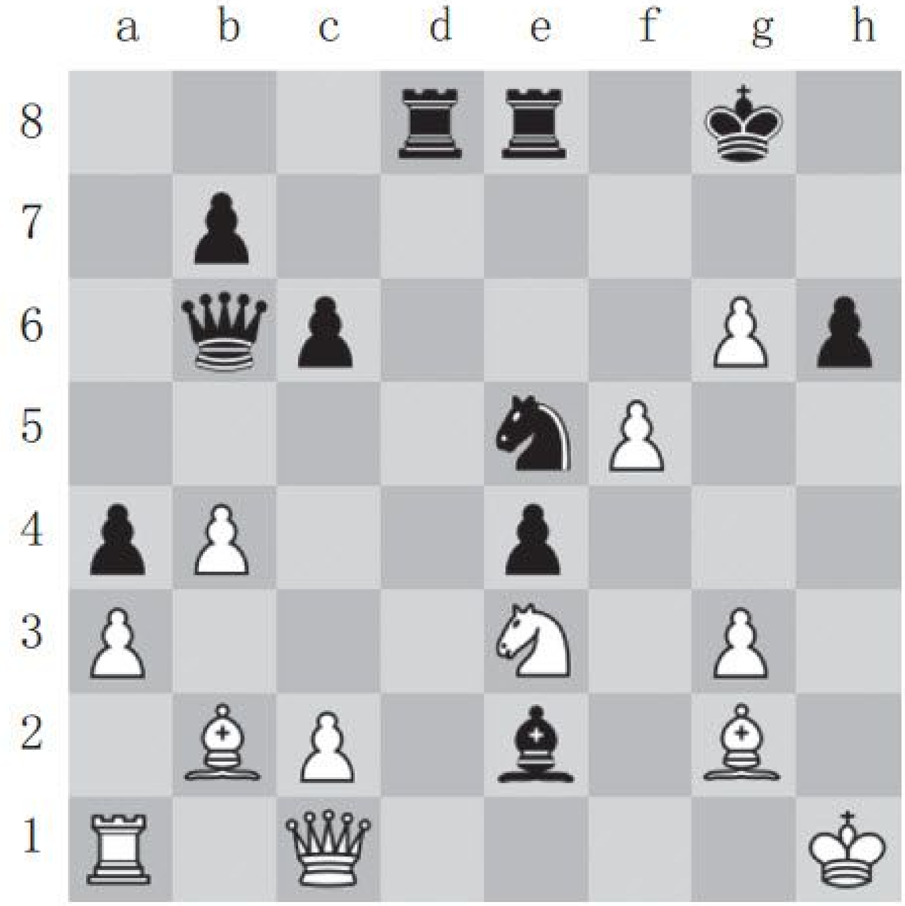
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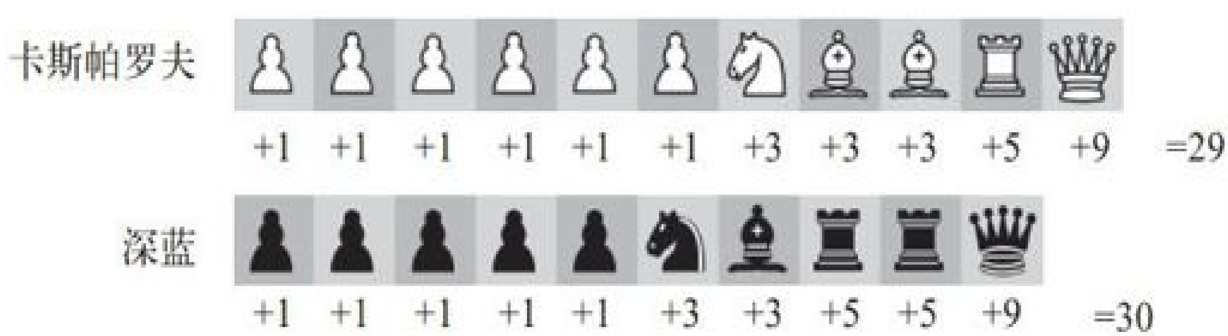
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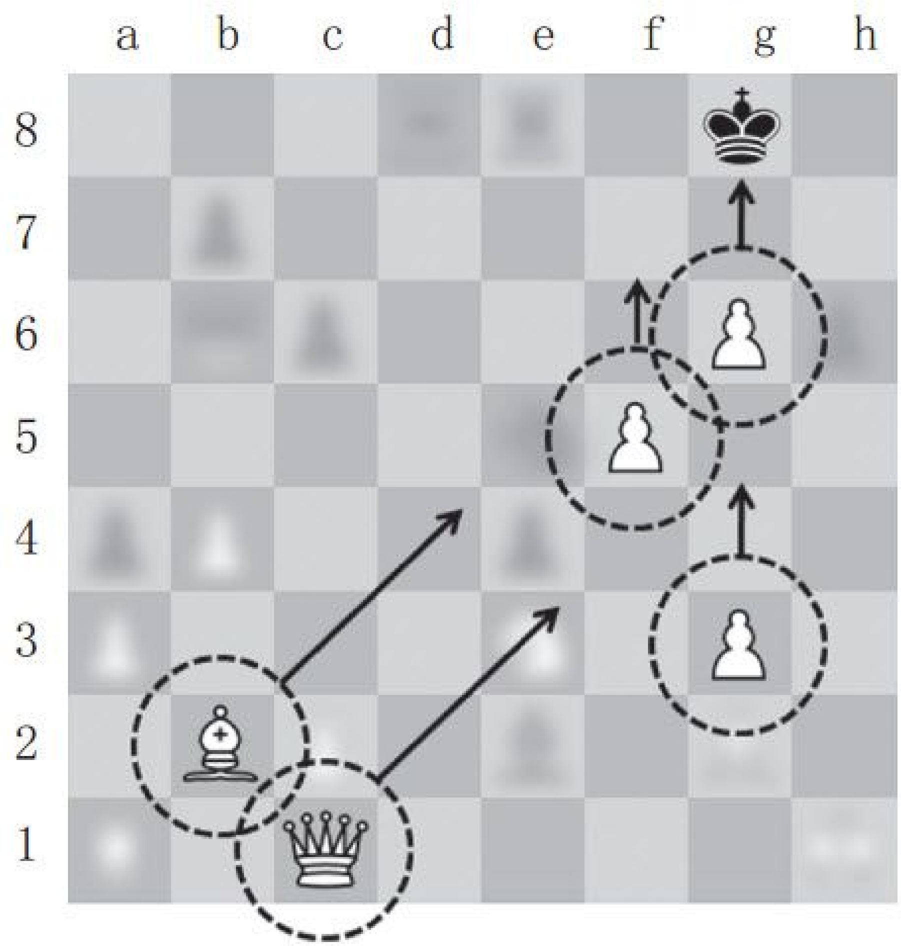
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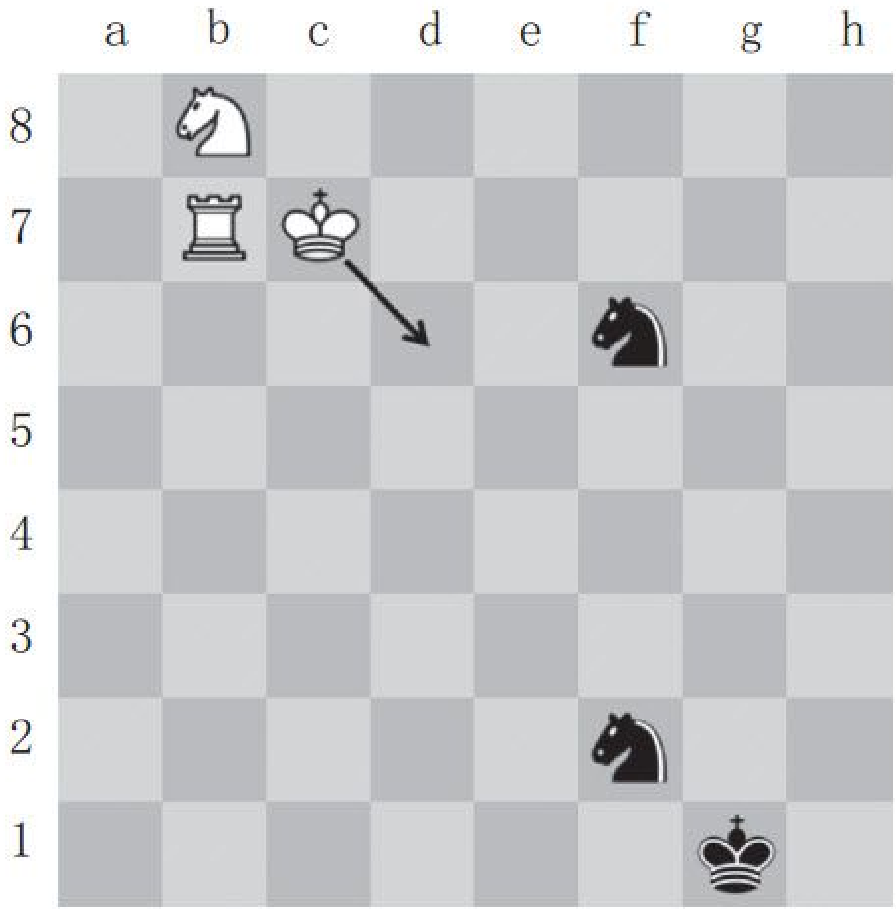
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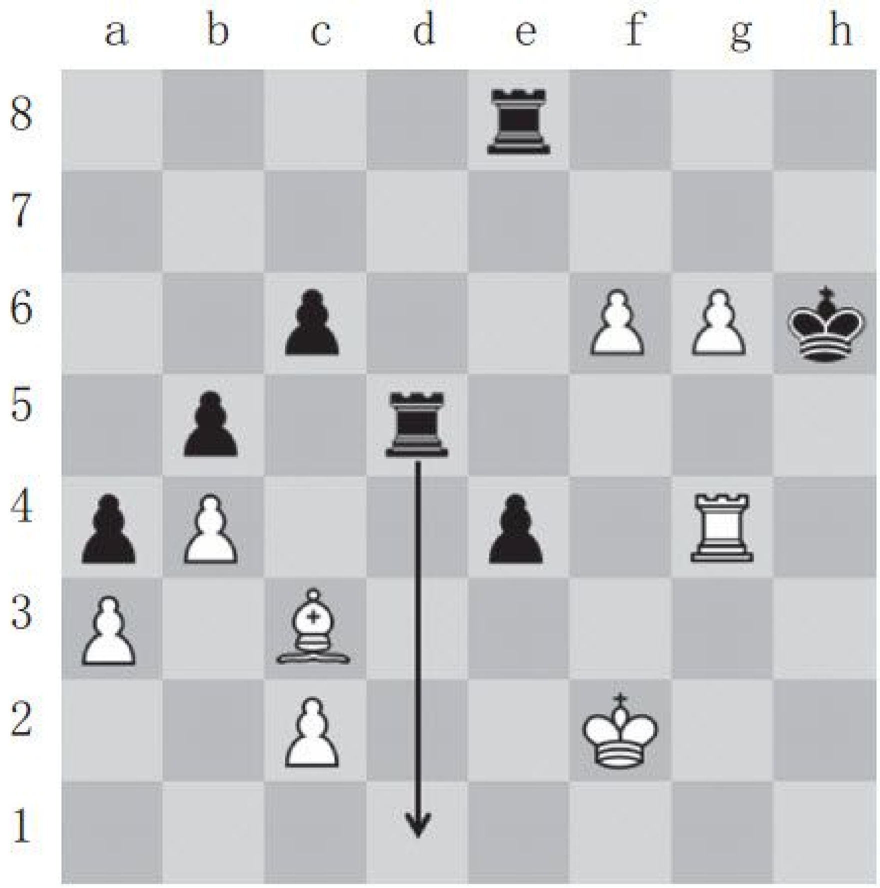
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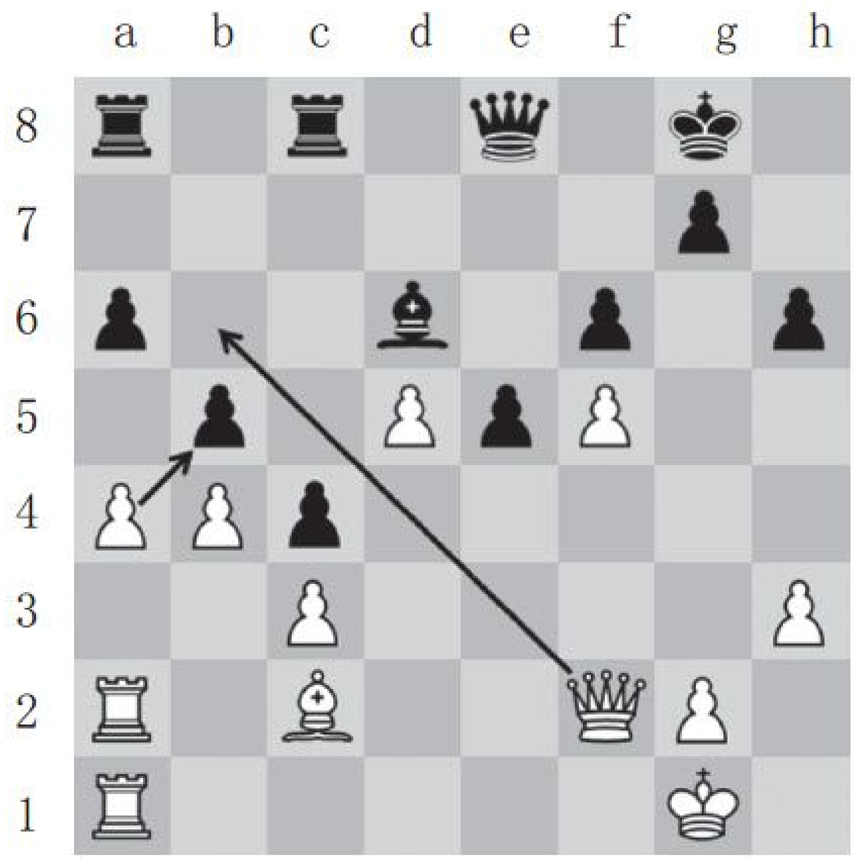
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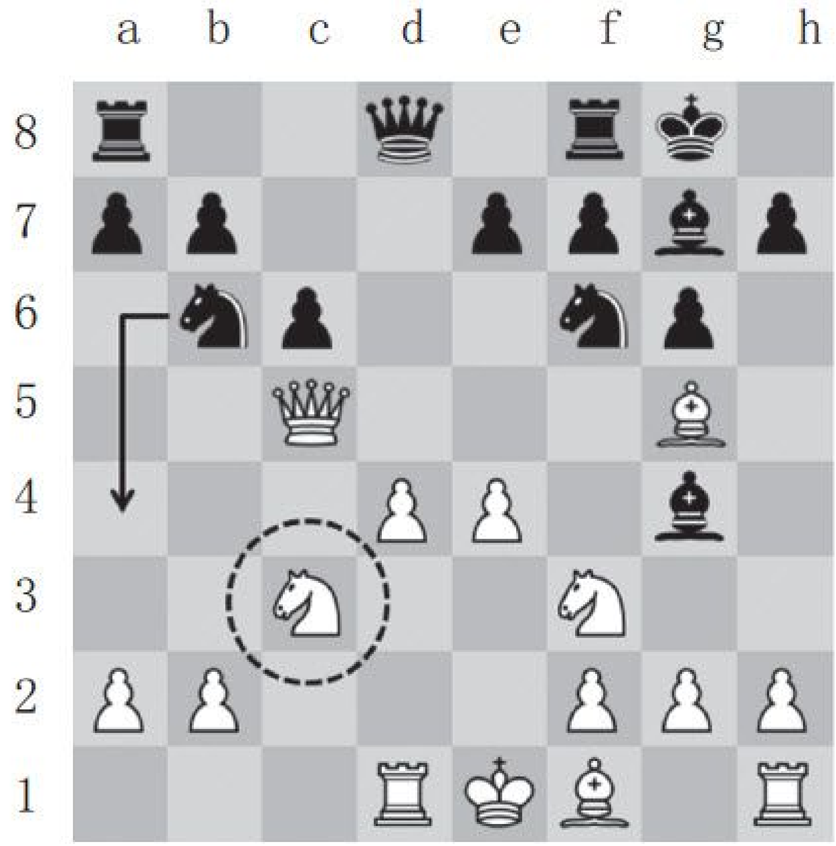
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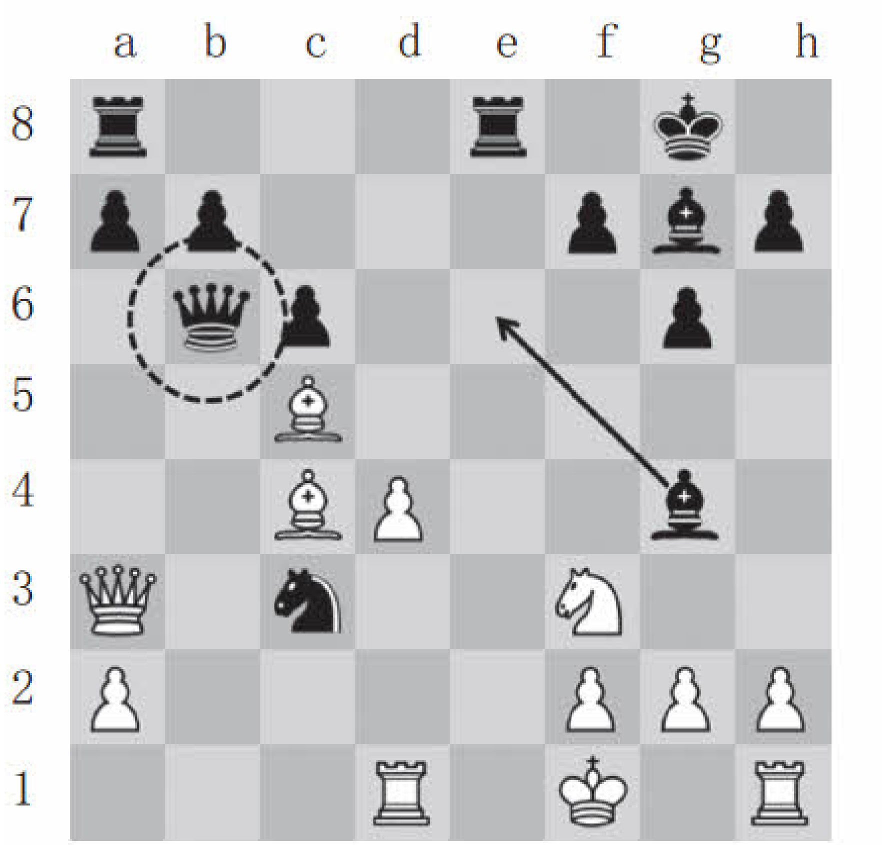
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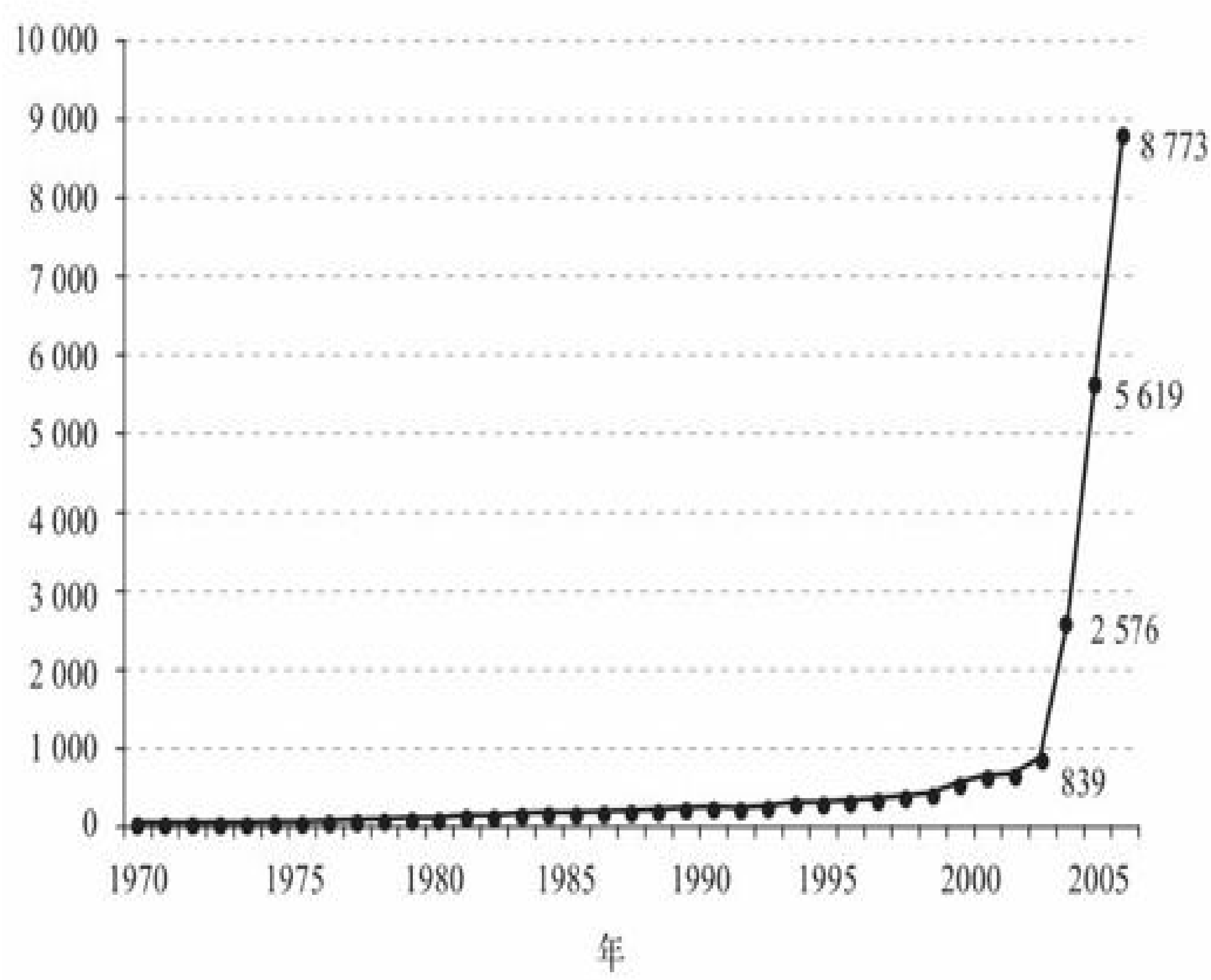
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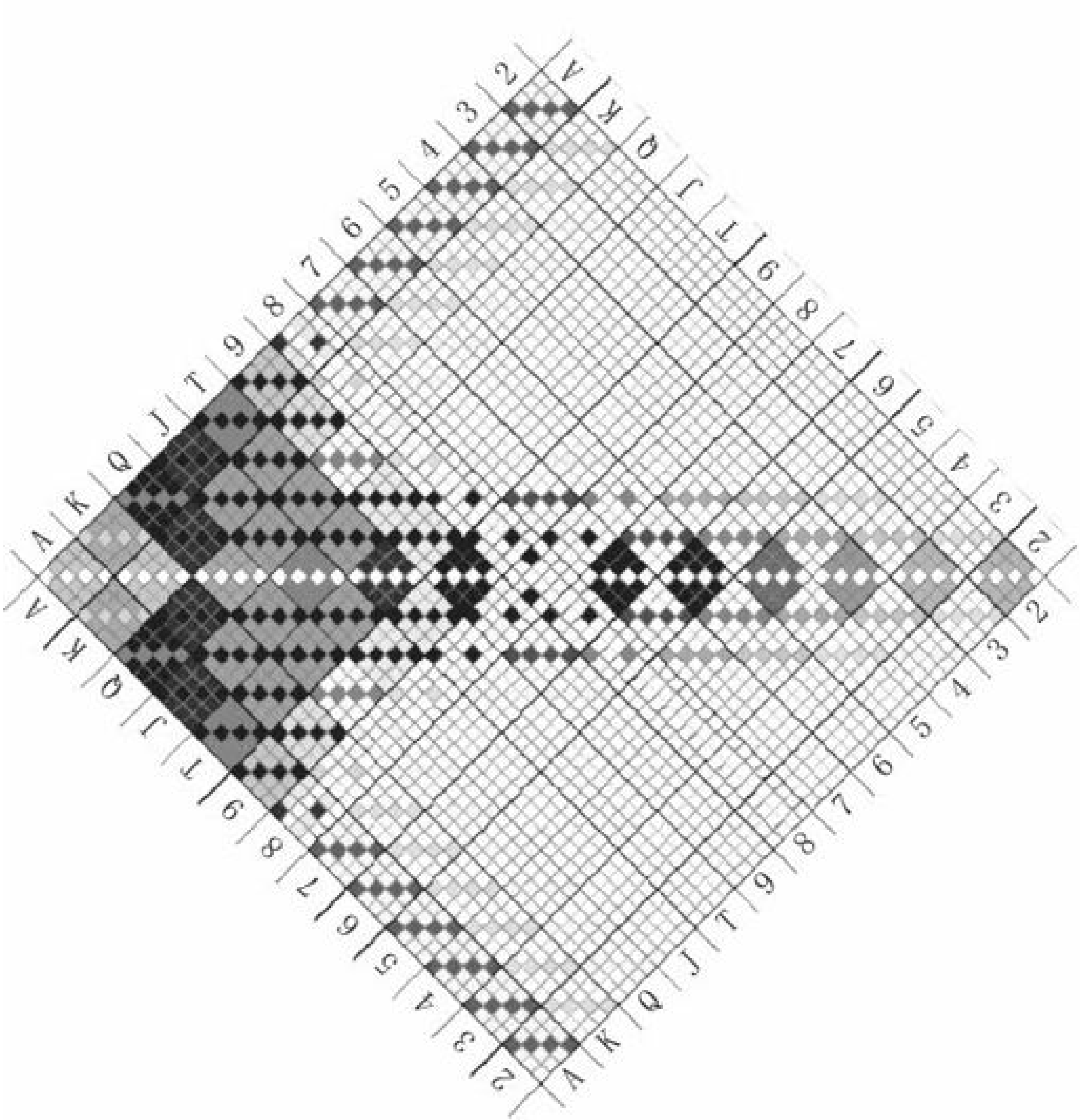
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K [illegible]	K♠ J♦	15%	28%
8 [illegible] Q [illegible]	9♦ 8♦	13%	20%
7 [illegible]	A♠ 3♠	15%	20%
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[illegible]	Q♦ T♠	12%	12%
[illegible]	A♥ J♣	35%	4%

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K □□□□□□	K♥ J♠	28%	45%
3 □ Q □□□	9♦ 7♦	40%	33%
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[illegible]	7♣ 6♣	1%	16%
3 [illegible] K [illegible] 9	9♦ 9♠	2%	17%
3 [illegible] 5 [illegible] 3	5♥ 5♣	2%	19%
[illegible]	K♥ 5♥	3%	20%
K [illegible]	A♠ A♦	44%	15%
8 [illegible] Q [illegible]	8♥ 7♥	35%	4%
[illegible]	7♠ 2♥	13%	9%

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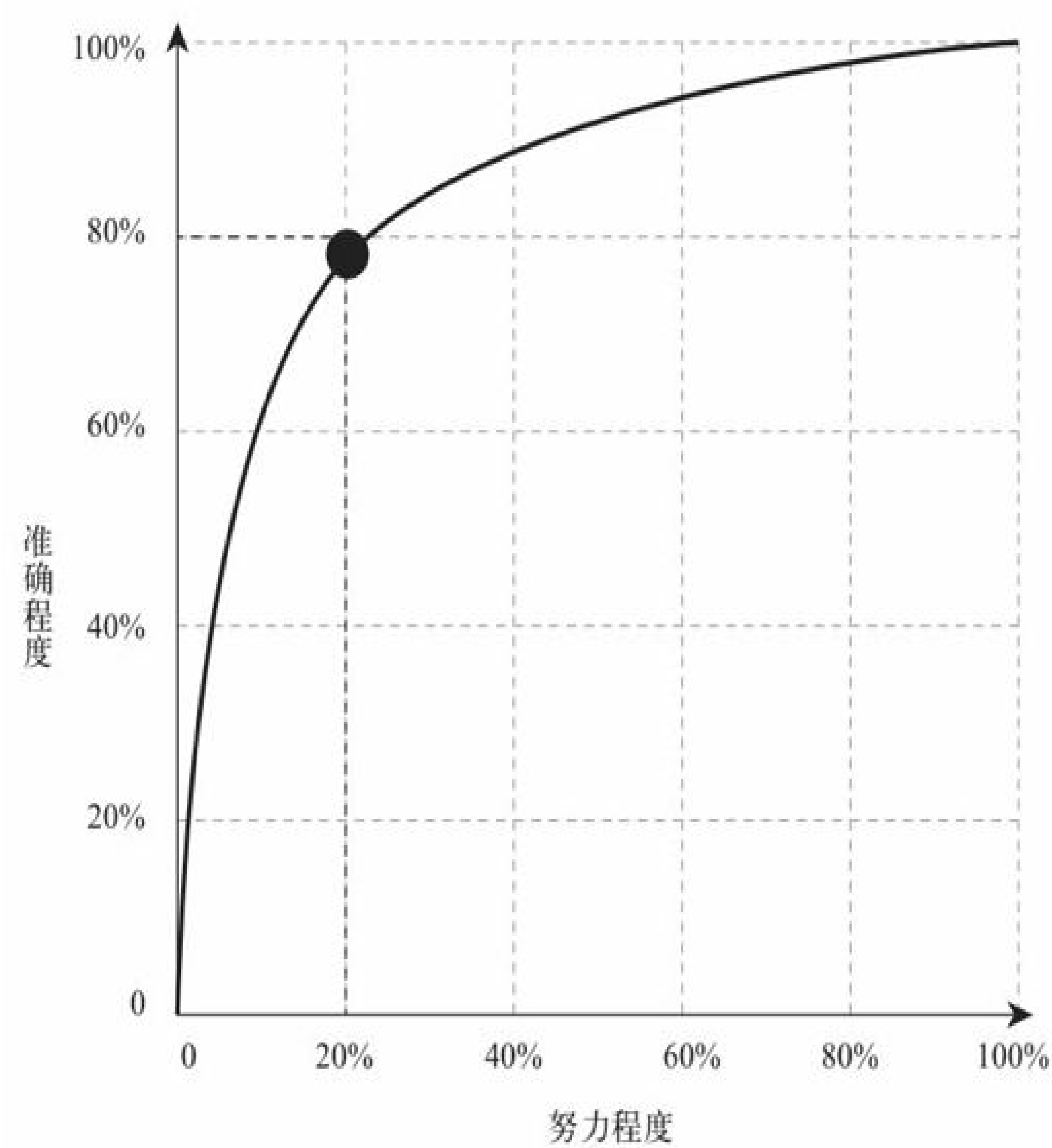
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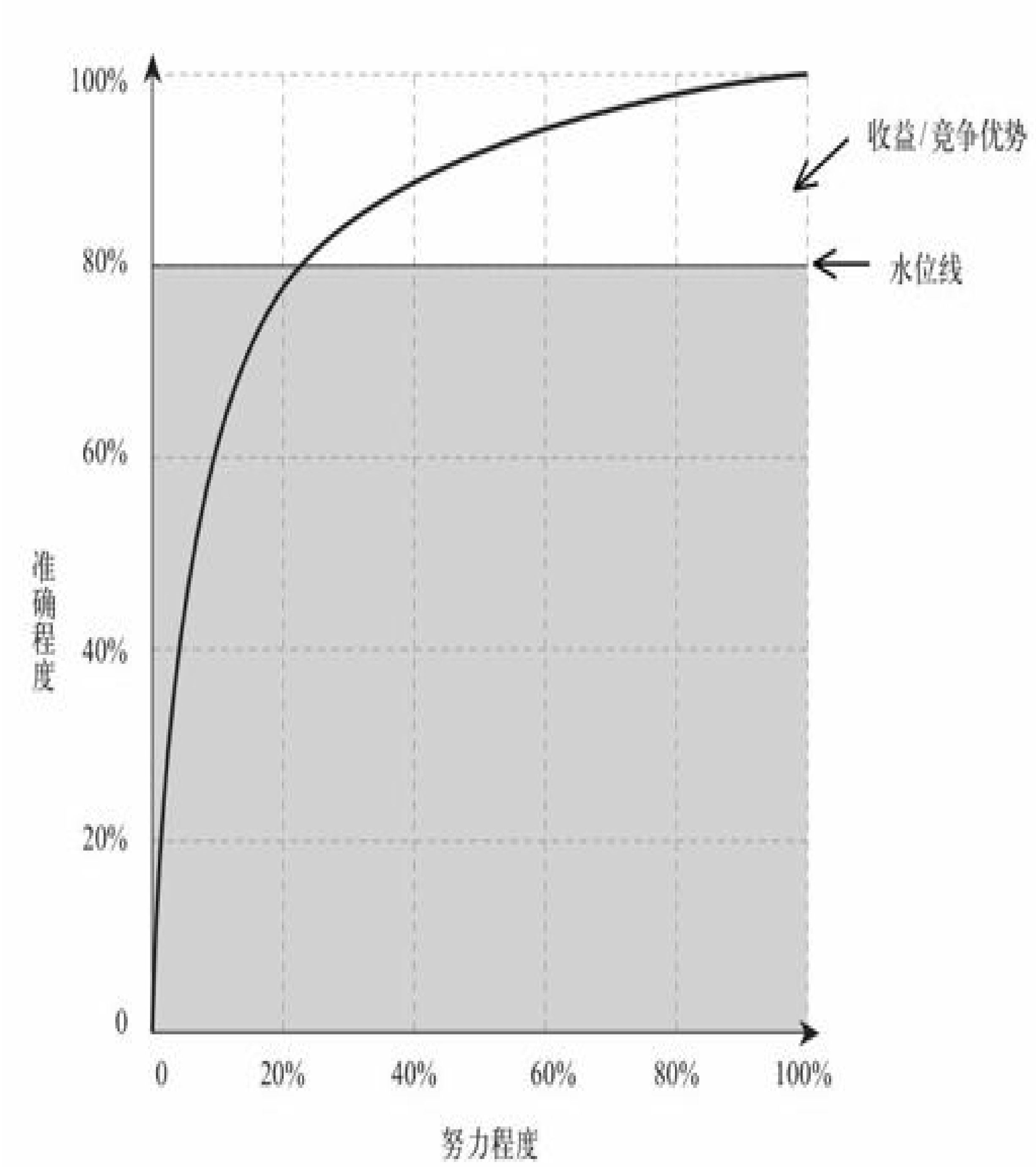
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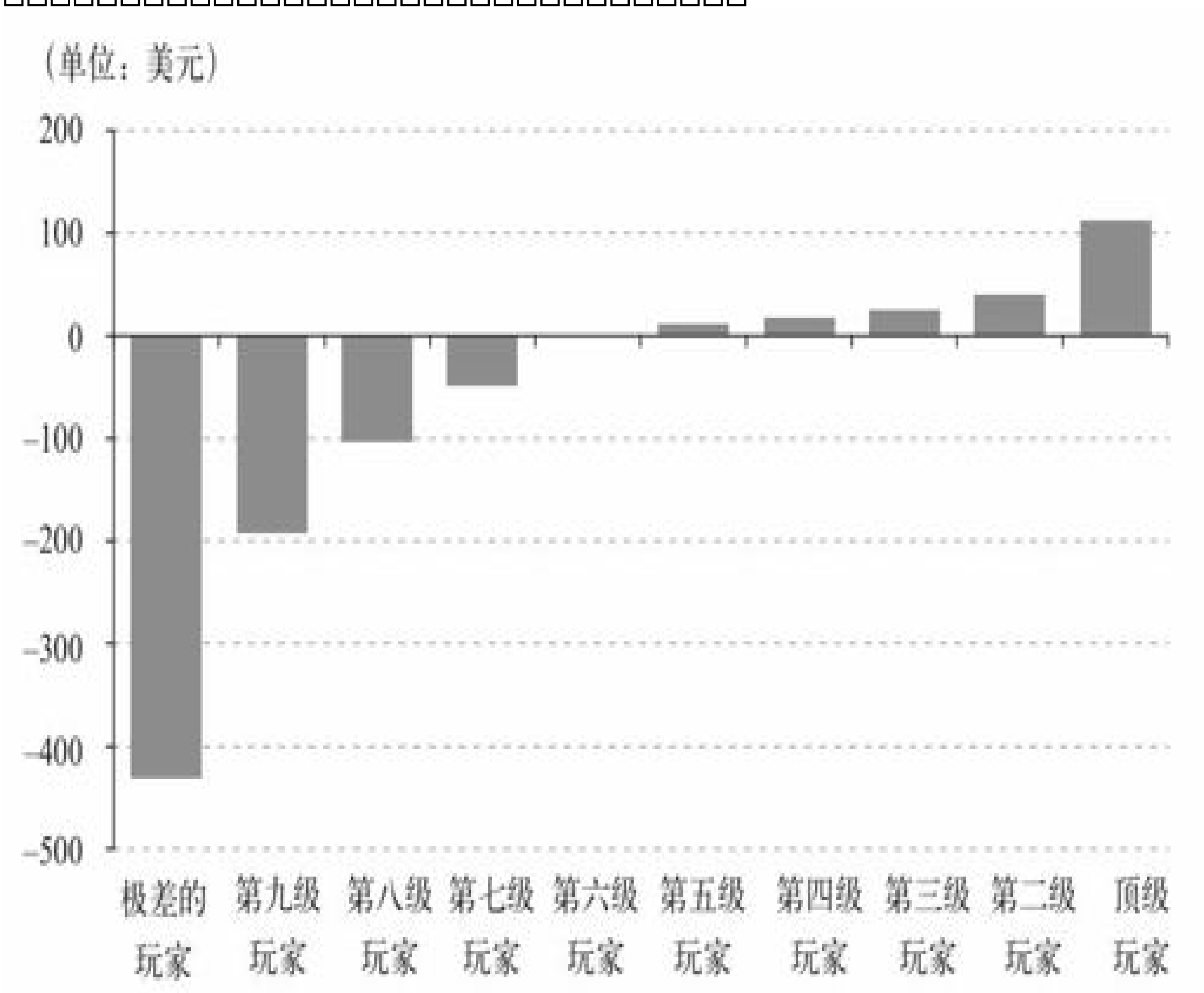
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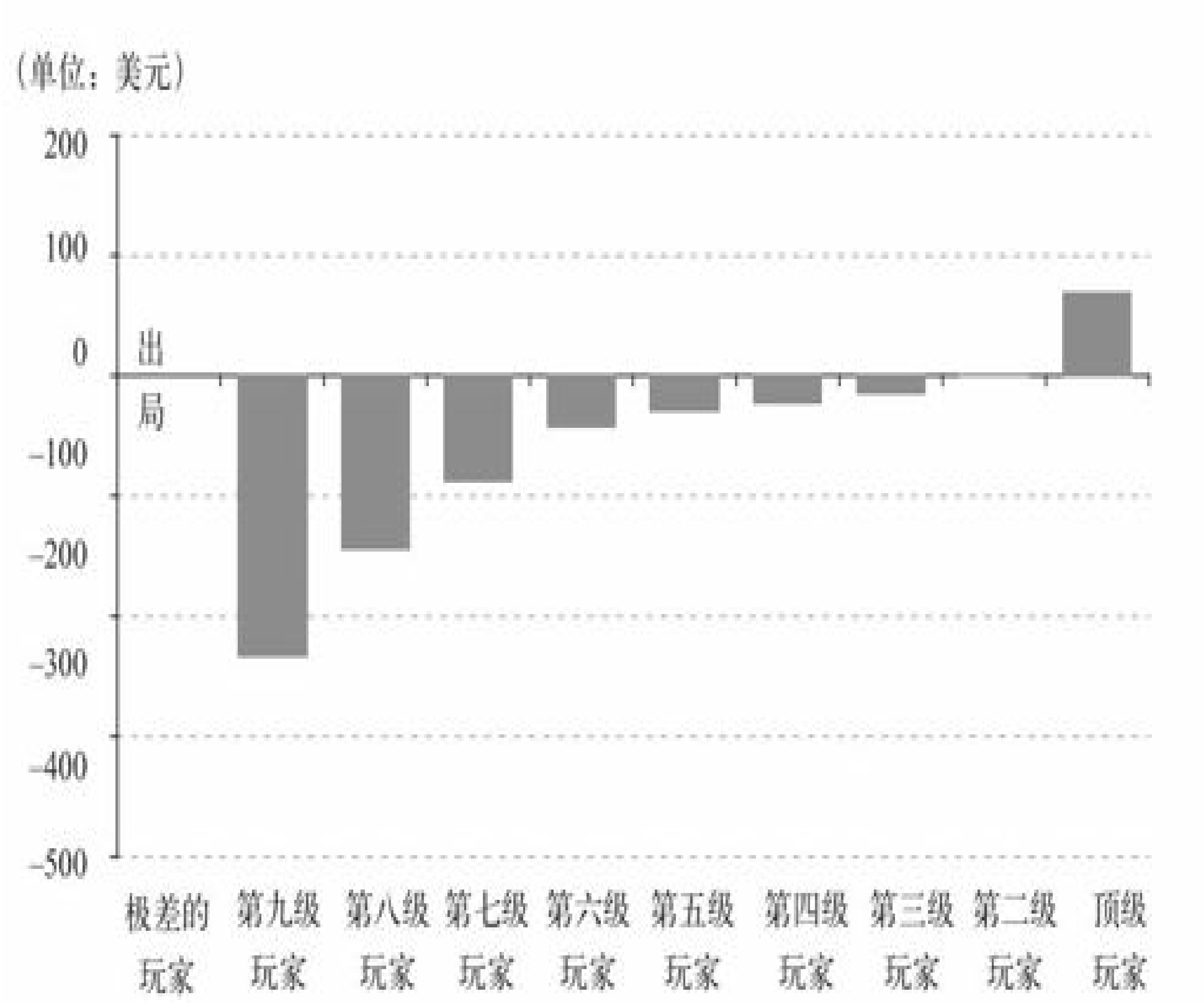
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2006 [illegible] 10 [illegible]“[illegible]”[illegible]“[illegible]”[illegible]UIGEA[illegible]

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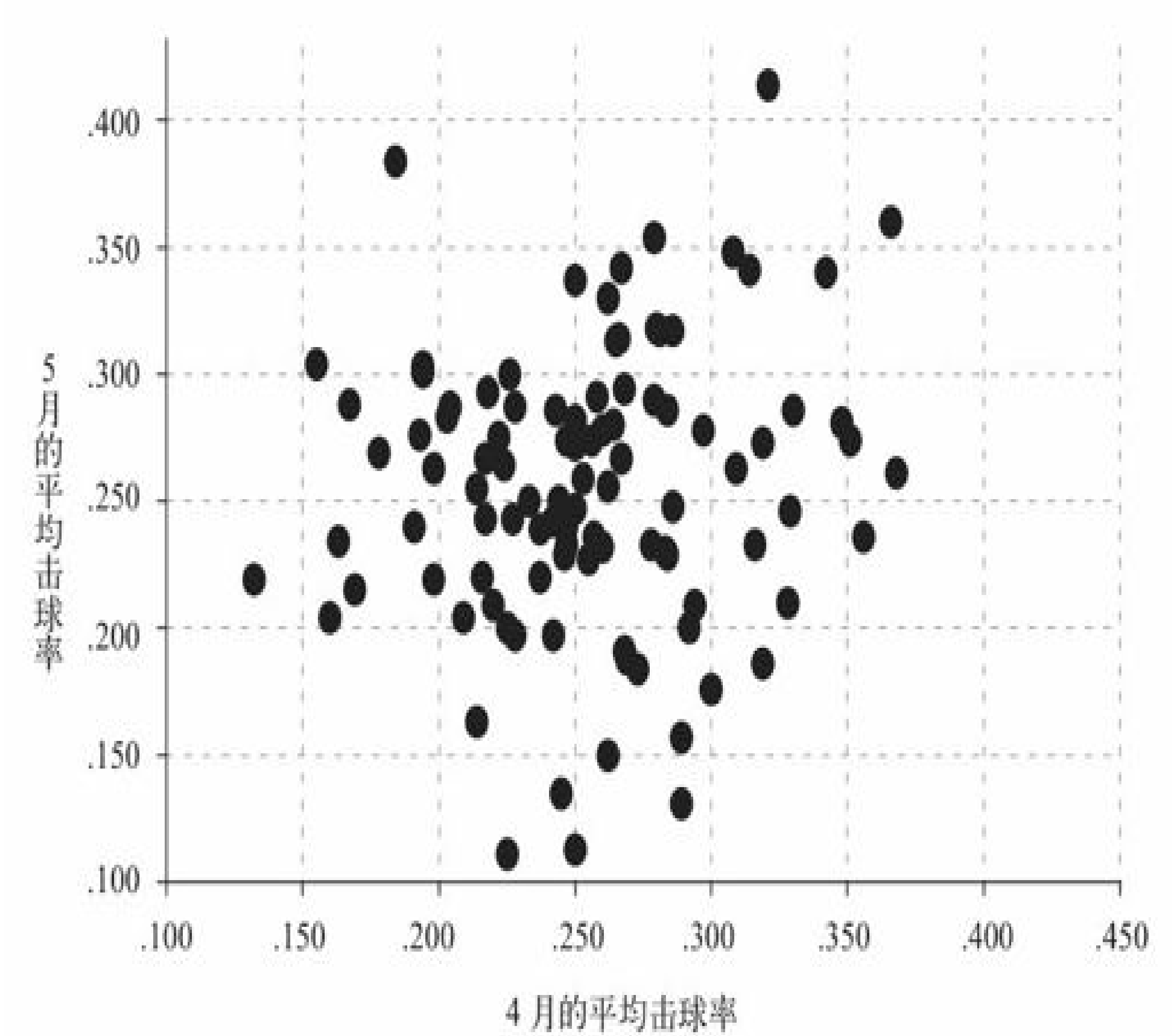
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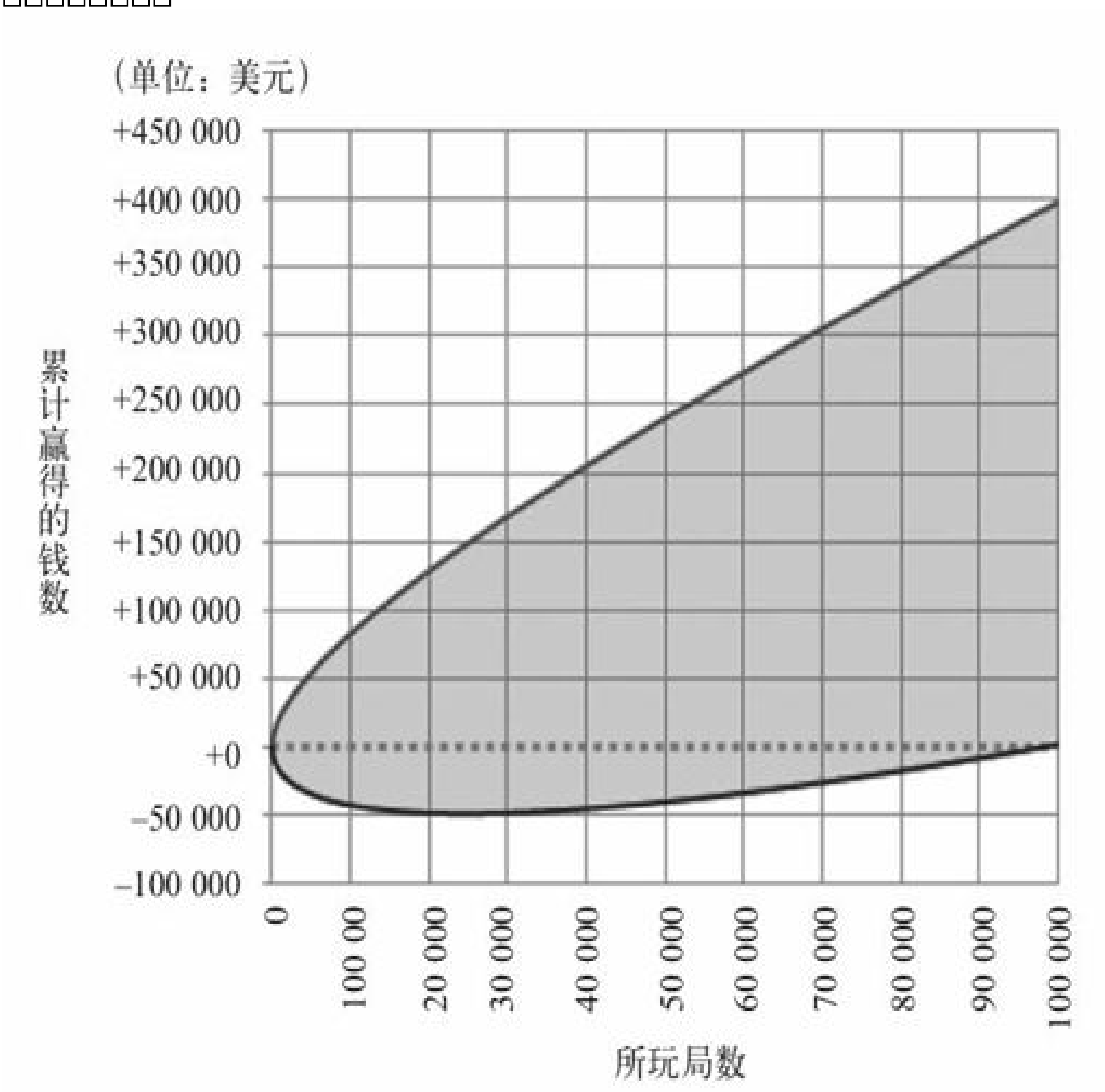
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[illegible] 500 [illegible]

[illegible] 52%[illegible] 4 [illegible]

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[1]5 [illegible] 10 [illegible] 500 000 000 [illegible] · [illegible] 500 [illegible] 499 999 500 [illegible]

[2][illegible] A [illegible]

[3][illegible]“[illegible]”[illegible] 80% [illegible] 2% [illegible] 2% [illegible]

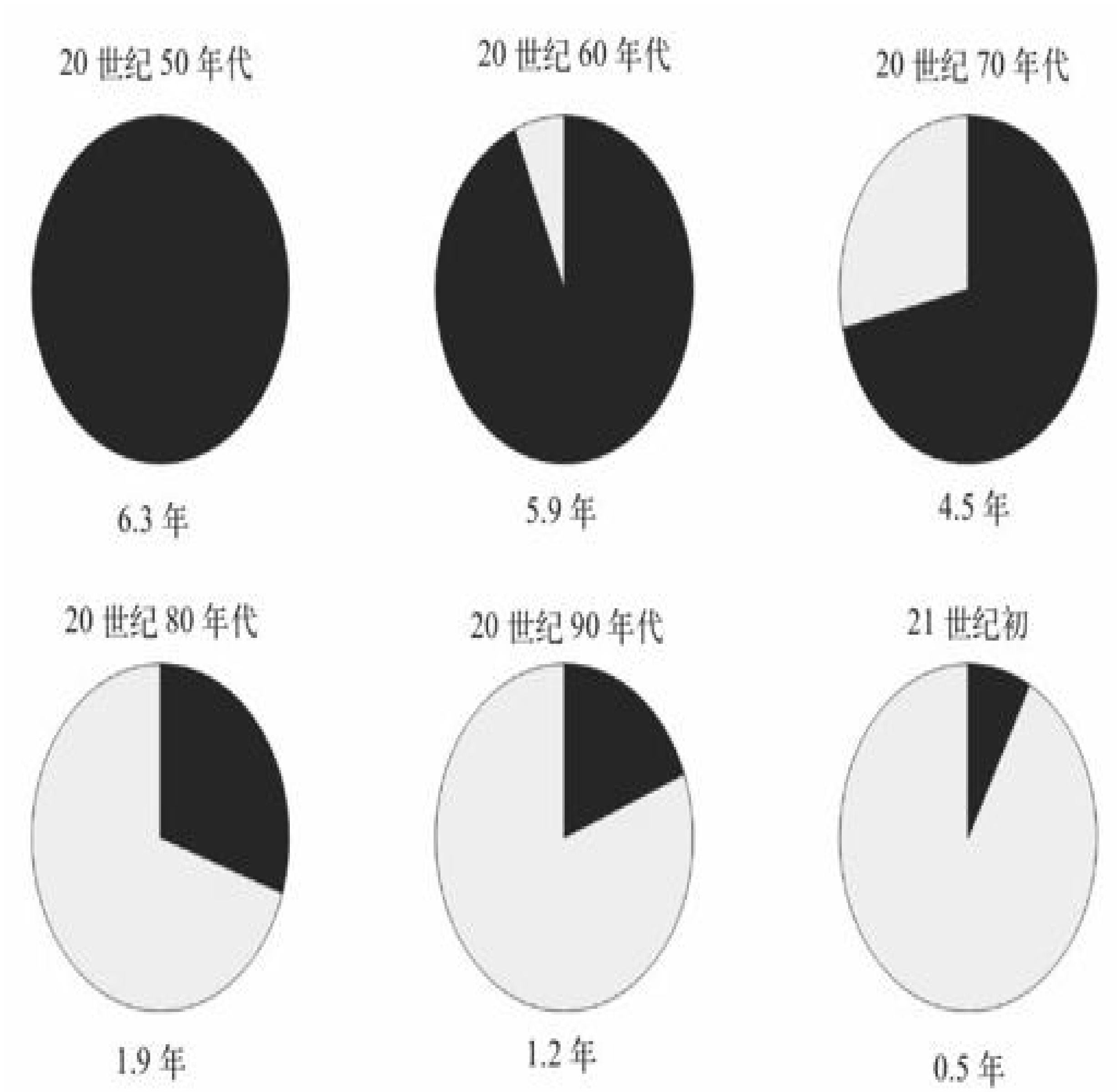
[illegible]

[illegible]

2009 [illegible] 2008 [illegible] 800 [illegible] 1 850 [illegible]2009 [illegible] 46 [illegible] 500 [illegible] 5 [illegible]

[illegible]20 [illegible] 50 [illegible] 6 [illegible]“[illegible]”[illegible] 21 [illegible] 6 [illegible] 6 [illegible],[illegible] 12 [illegible] 4~5 [illegible]

[illegible] A [illegible] B [illegible] 0.190[illegible] A [illegible] B [illegible]


20 世纪 50 年代
6.3 年
20 世纪 60 年代
5.9 年
20 世纪 70 年代
4.5 年
20 世纪 80 年代
1.9 年
20 世纪 90 年代
1.2 年
21 世纪初
0.5 年

[illegible] **11–1** [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

今日价格

- 奥巴马连任……………………………55%
- 琳赛 · 洛翰被捕………………………99%
- 股市崩盘…………………………………10%
- 在火星上探测出生命……………………2%
- 纳达尔赢得温布尔登网球公开赛……30%

[illegible] **11-2** [illegible]

[illegible] 30% [illegible] 50% [illegible] 40% [illegible] · [illegible] · [illegible] —— [illegible]

[illegible]

[illegible]

[illegible]“[illegible]”

[illegible] · [illegible] · [illegible] · [illegible] · [illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible] GDP [illegible]

[illegible]

[illegible]

[illegible]

[illegible]·[illegible]——[illegible]——[illegible]·[illegible] Intrade. com [illegible]·[illegible]

[illegible]“[illegible]”[illegible]·[illegible]——[illegible]·[illegible]

[illegible] Intrade. com [illegible]——[illegible]·[illegible] 2008 [illegible] 100 [illegible]“[illegible]“[illegible] 18 [illegible]“[illegible]”[illegible] 66 [illegible]“[illegible]”[illegible] 1892 [illegible]——[illegible]·[illegible]·[illegible]

[illegible]“[illegible]”[illegible]

[illegible]“[illegible] 2008 [illegible]”

“[illegible]”[illegible]“[illegible] Intrade. com [illegible]”

“[illegible]Intrade. com [illegible]”[illegible]

[illegible]“538”[illegible] 2008 [illegible] Intrade. com [illegible]“538”[illegible]

[illegible] Intrade. com [illegible]

[illegible]

[illegible] Intrade. com [illegible]“538”[illegible]“538”[illegible]“538”[illegible] Intrade. com [illegible] Intrade. com [illegible]

[illegible] 15%~20%[illegible]

[illegible] 3 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible] 70 [illegible] 99.5%[illegible]“[illegible]”[illegible] 15%~20%[illegible]

[illegible] Intrade. com [illegible]“538”[illegible]“[illegible]”[illegible]“538”[illegible]

[illegible] Intrade. com [illegible]

“[illegible]”[illegible]“[illegible] Intrade. com [illegible]”

[illegible]

[illegible] Intrade. com [illegible]Intrade. com [illegible]“[illegible]”[illegible] 2012 [illegible] 3 [illegible]“[illegible]”[illegible]Intrade. com [illegible] 160 [illegible] 800 [illegible]“[illegible]”[illegible] 9 000 [illegible]Intrade. com [illegible]“[illegible]”[illegible]

[illegible]“538”[illegible] Intrade. com [illegible] Intrade. com [illegible]

[illegible]“[illegible]”[illegible]

[illegible]

1959 [illegible]20 [illegible]·[illegible] 1.77 [illegible]

[illegible]1965 [illegible]·[illegible] 20 [illegible] 80 [illegible] 1950~1960 [illegible]

[illegible]“[illegible]”[illegible]

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[illegible] 4 000 [illegible]

[illegible]

[illegible]

[illegible]

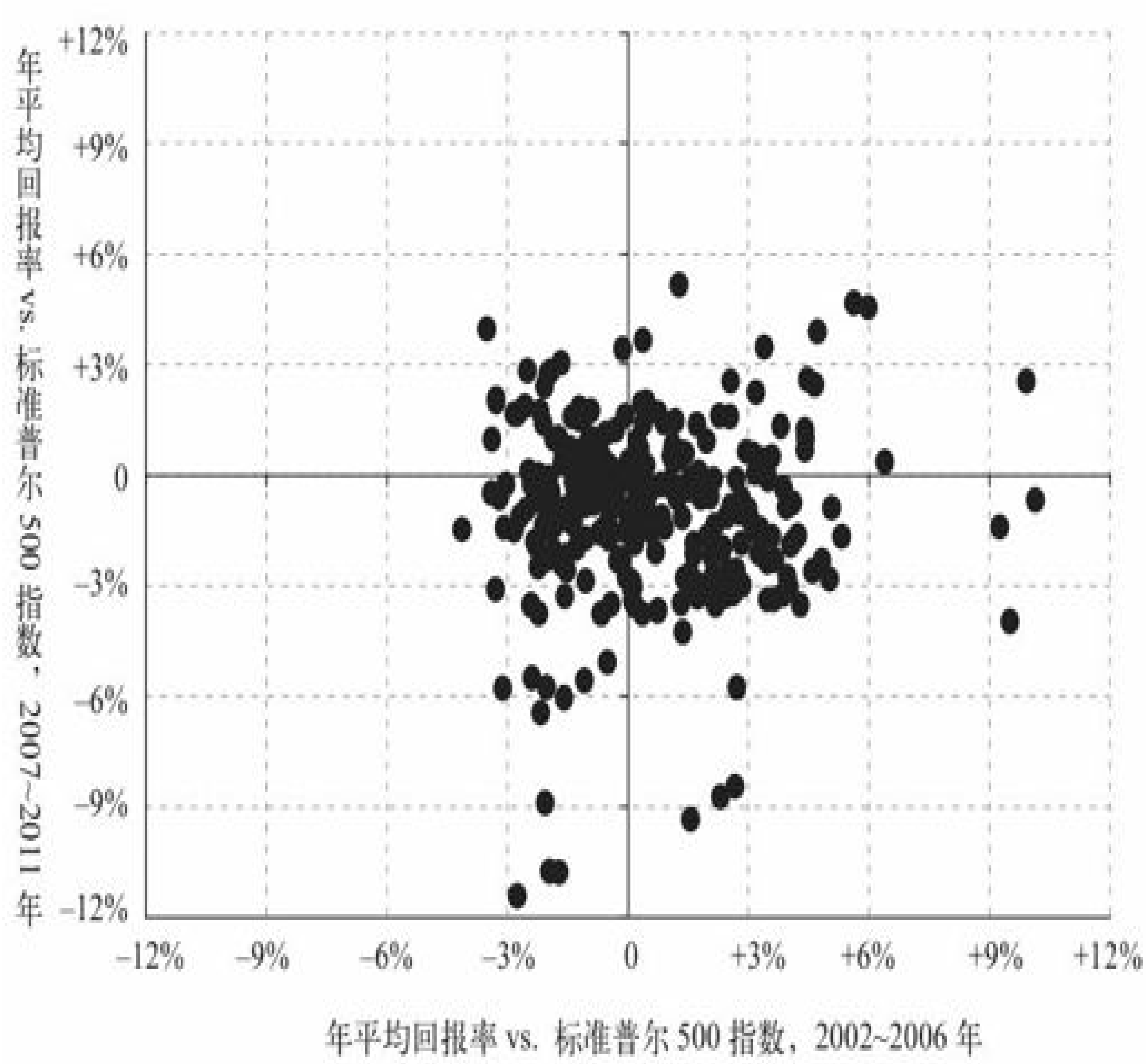
[illegible]“[illegible]”[illegible]

[illegible] 2007 [illegible]·[illegible] 500 [illegible] 5 [illegible] EVTMX[illegible] A[illegible] 2002~2006 [illegible] 10%[illegible] JSVAX[illegible] T[illegible] 9%[illegible]

[illegible] 2002~2006 [illegible] 2007~2011 [illegible] EVTMX [illegible] 2002~2006 [illegible] 5 [illegible] JSVAX [illegible] 3%[illegible] 5 [illegible]

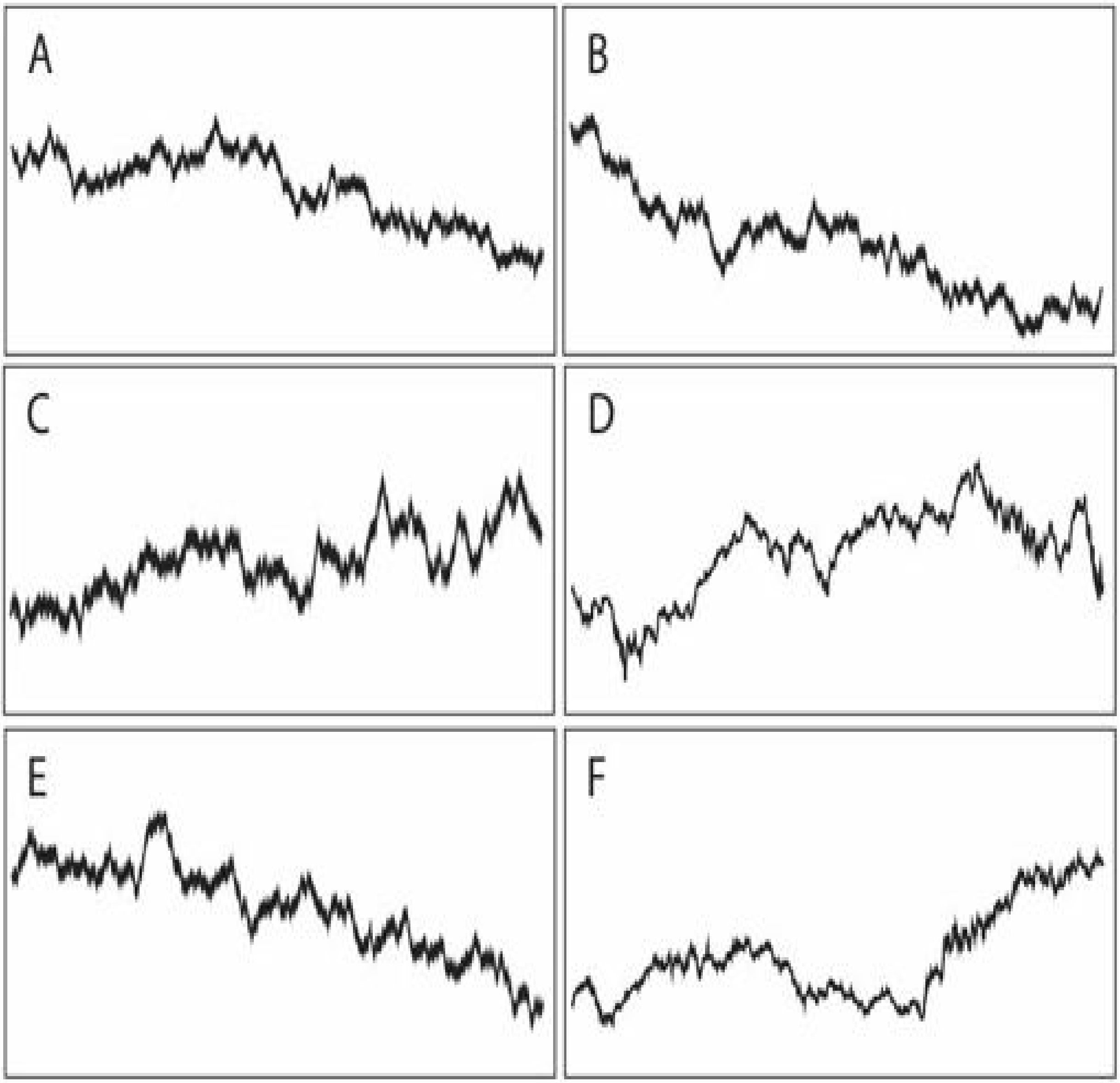
[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]——[illegible]



年平均回报率 vs. 标准普尔 500 指数，2007~2011 年
+12%
+9%
+6%
+3%
0
–3%
–6%
–9%
–12%
–12%
–9%
–6%
–3%
0
+3%
+6%
+9%
+12%
年平均回报率 vs. 标准普尔 500 指数，2002~2006 年

11–3


A
B
C
D
E
F

[illegible] 5%~10%[illegible]·[illegible]

[illegible] 900 [illegible]

[illegible] 200 [illegible]

[illegible]“[illegible]”[illegible] 10%[illegible] 20 [illegible] 12%[illegible] 3 [illegible]

[illegible] 0.25%[illegible]

[illegible]

[illegible]

[illegible]

[illegible] 1966~1975 [illegible] 10 [illegible]——[illegible] 10 [illegible]——[illegible]·[illegible]·[illegible] 58%[illegible]——[illegible] 42%[illegible] 1/7 000 000 000 000 000[illegible]

[illegible]

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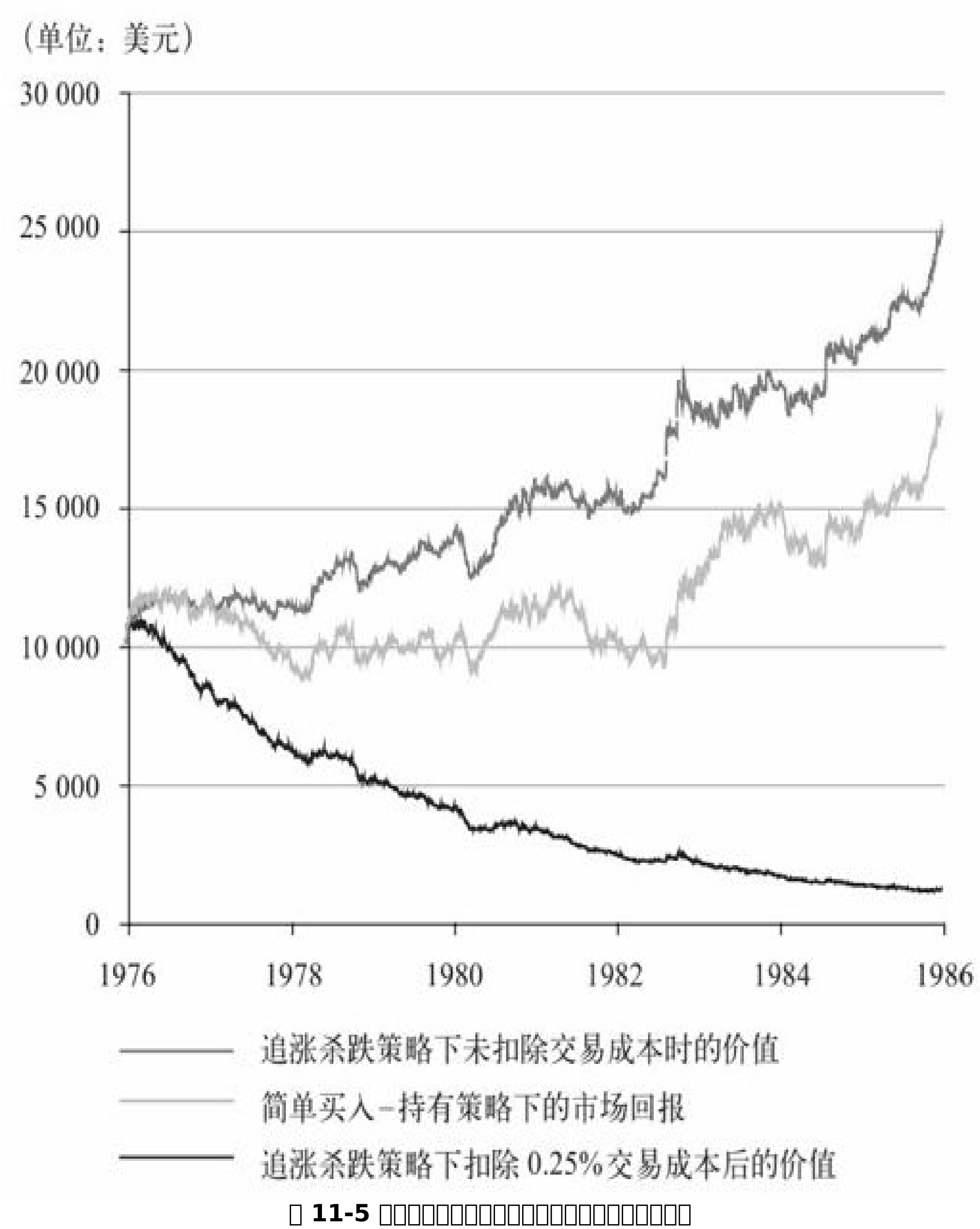
[illegible]10 [illegible] 1985 [illegible]

[illegible] 10 [illegible] 1976 [illegible] 10 000 [illegible] 10 [illegible] 25 000 [illegible]“[illegible]”[illegible]10 [illegible] 10 000 [illegible] 18 000 [illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible] 0.25%[illegible]“[illegible]”[illegible] 10 [illegible]10 000 [illegible] 1 100 [illegible]

[illegible] 21 [illegible] 54%[illegible]“[illegible]”[illegible] 10 [illegible] 2000 [illegible] 1 [illegible]“[illegible]”[illegible]10 [illegible] 10 000 [illegible] 4 000 [illegible] 141 [illegible] 99%[illegible]

[illegible]“[illegible]”[illegible][1][illegible]——[illegible]



[illegible] 11-5 [illegible]

[illegible]

[illegible] 20 [illegible] 90 [illegible] 21 [illegible]
[illegible]1998 [illegible] 2000 [illegible] 2 [illegible]

[illegible]



[illegible] 11-6 1990-2004 [illegible]

[illegible] 35%[illegible] 1/3[illegible] 2000 [illegible] 10 [illegible] 10 500 [illegible] Skype[2] [illegible]“[illegible]”[illegible]

[illegible] 10 [illegible] 2010 [illegible] 7%[illegible] Pet.com [illegible]

[illegible]“[illegible]”[illegible]“[illegible]”

[illegible]

[illegible] 500 [illegible]5 [illegible] 8 [illegible] 5 [illegible] 1987 [illegible]“[illegible]”[illegible]

[illegible]·[illegible]·[illegible] 36 000 [illegible]·[illegible] 40 000 [illegible]·[illegible] 100 000 [illegible]

[illegible] 10 [illegible] P/E[illegible] 15[illegible] 15 [illegible]

[illegible] 500 [illegible]

[illegible] 500 [illegible] 5 [illegible]1921 [illegible] 44[illegible]2000 [illegible] 10 [illegible] 9%[illegible] 10 000 [illegible] 10 [illegible] 22 000 [illegible] 25 [illegible] 10 000 [illegible] 10 [illegible] 12 000 [illegible] 30 [illegible]——1929 [illegible] 2000 [illegible] 30——[illegible]

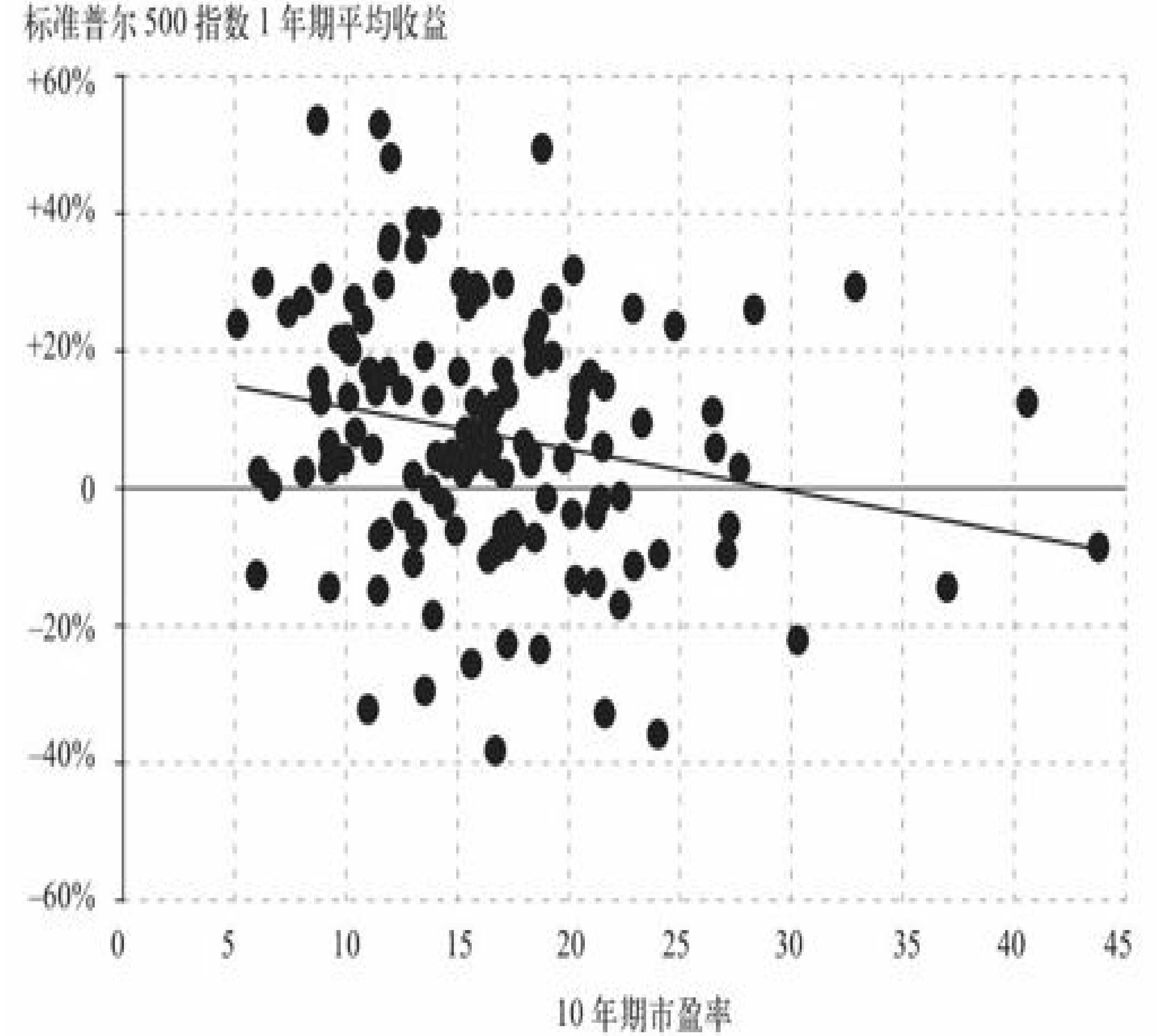
[illegible]1996 [illegible] 12 [illegible]·[illegible]“[illegible]”[illegible] 500 [illegible] 28[illegible] 1929 [illegible]“[illegible]”[illegible]“[illegible]”[illegible] 33 [illegible] 3 [illegible] 4 [illegible] 10 [illegible] 20 [illegible]

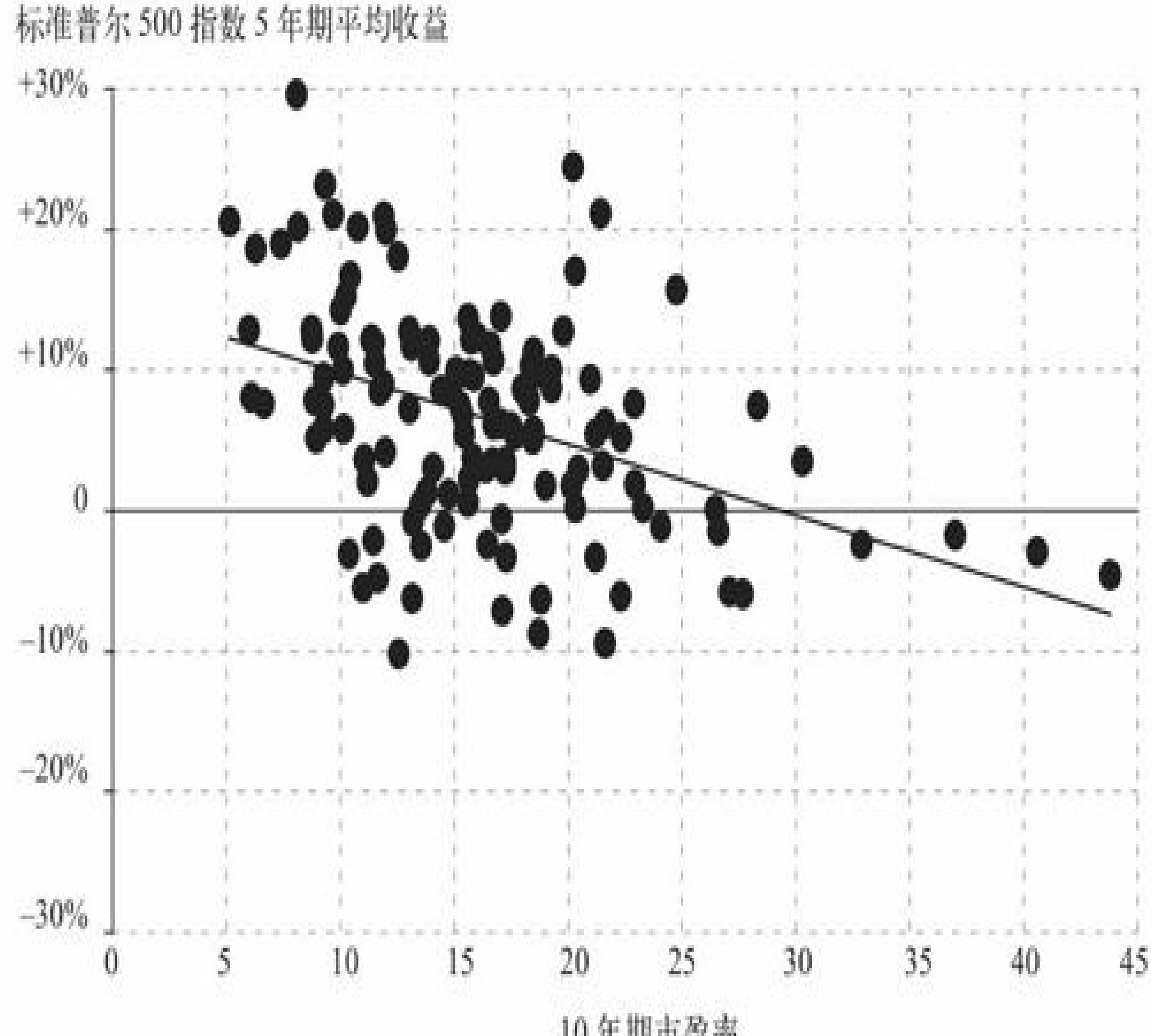
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[illegible]

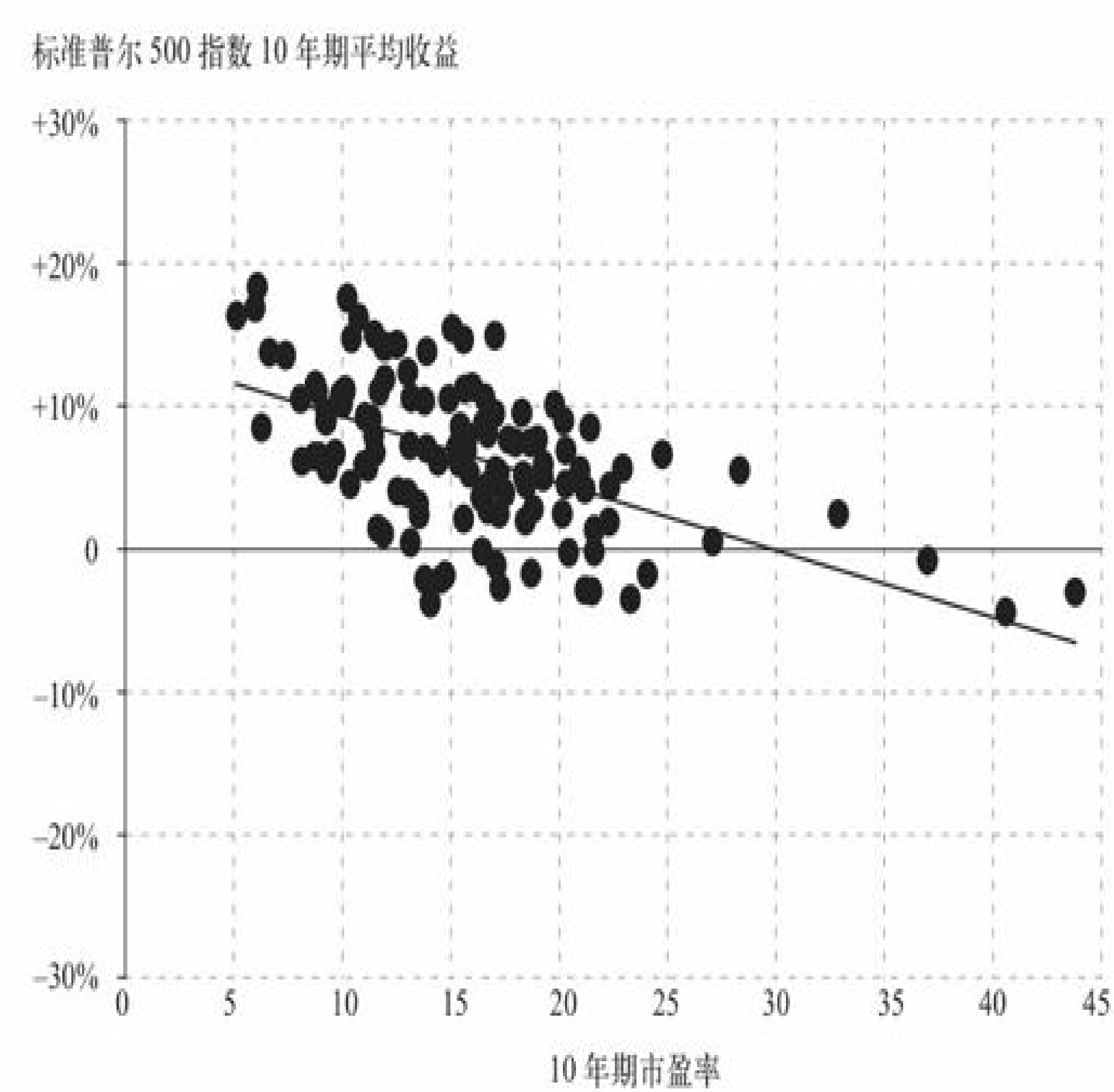
[illegible]——[illegible]MGM[illegible]——[illegible] 10%[illegible]MGM [illegible] 100 [illegible] 110 [illegible] 100 [illegible] 102 [illegible] 104 [illegible] 110 [illegible]

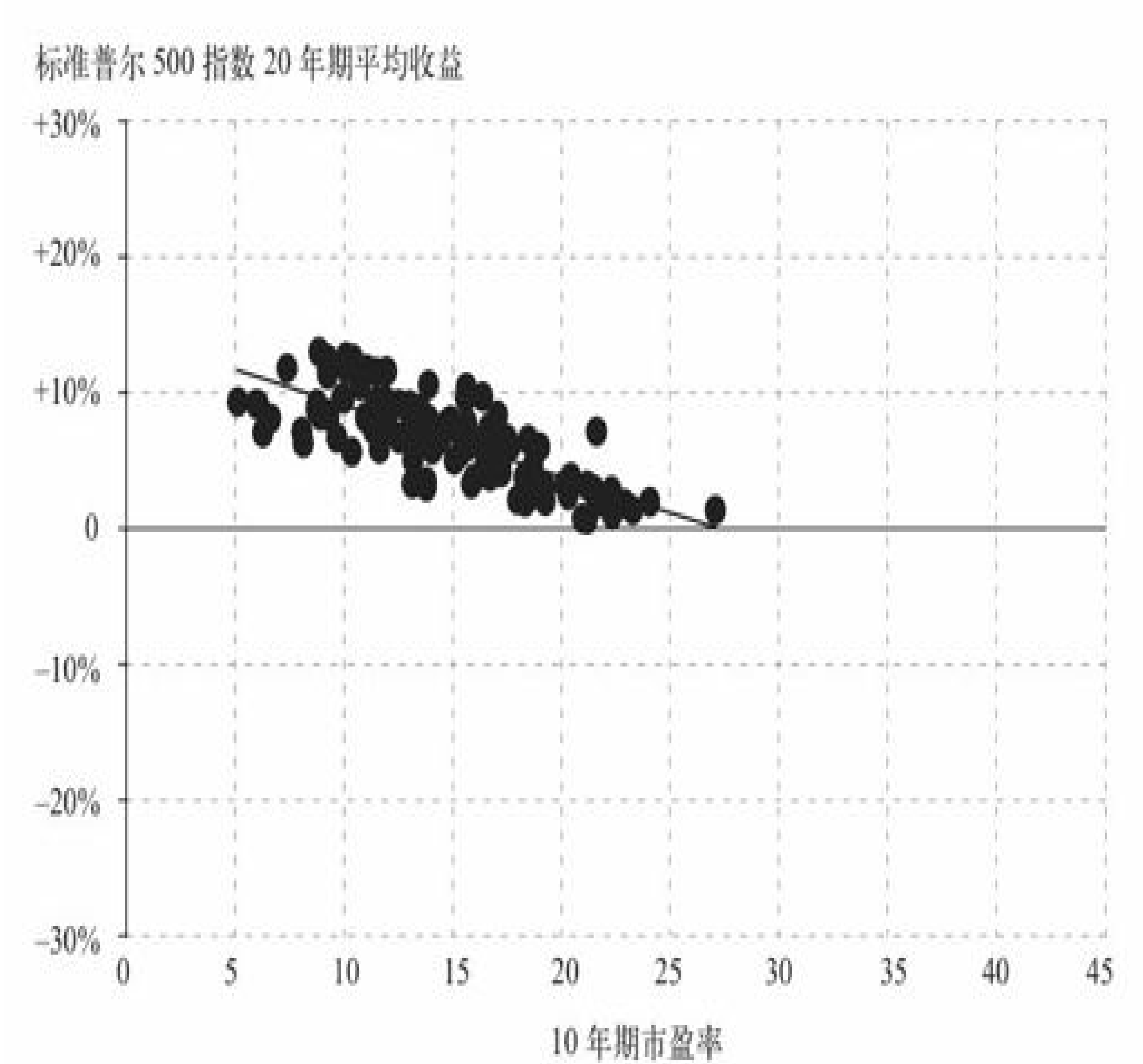
[illegible] MGM [illegible] 10%[illegible]


标准普尔 500 指数 1 年期平均收益
+60%
+40%
+20%
0
-20%
-40%
-60%
0
5
10
15
20
25
30
35
40
45
10 年期市盈率



标准普尔500指数5年期平均收益
+30%
+20%
+10%
0
-10%
-20%
-30%
0
5
10
15
20
25
30
35
40
45
10年期市盈率


标准普尔500指数10年期平均收益
+30%
+20%
+10%
0
−10%
−20%
−30%
0
5
10
15
20
25
30
35
40
45
10年期市盈率



[illegible] 11-7 [illegible]

[illegible]

[illegible]

[illegible]·[illegible] 1998 [illegible] CIBC [illegible] 1988 [illegible] 12 [illegible] 243 [illegible] 400 [illegible] 400 [illegible]

[illegible] 25%[illegible] 1998 [illegible]“[illegible]”[illegible]

[illegible]1988 [illegible] 243 [illegible] 2011 [illegible] 1 300 [illegible]“[illegible]”[illegible]“[illegible]”[illegible] Lifeminder.com [illegible]24/7 [illegible] 95%[illegible]

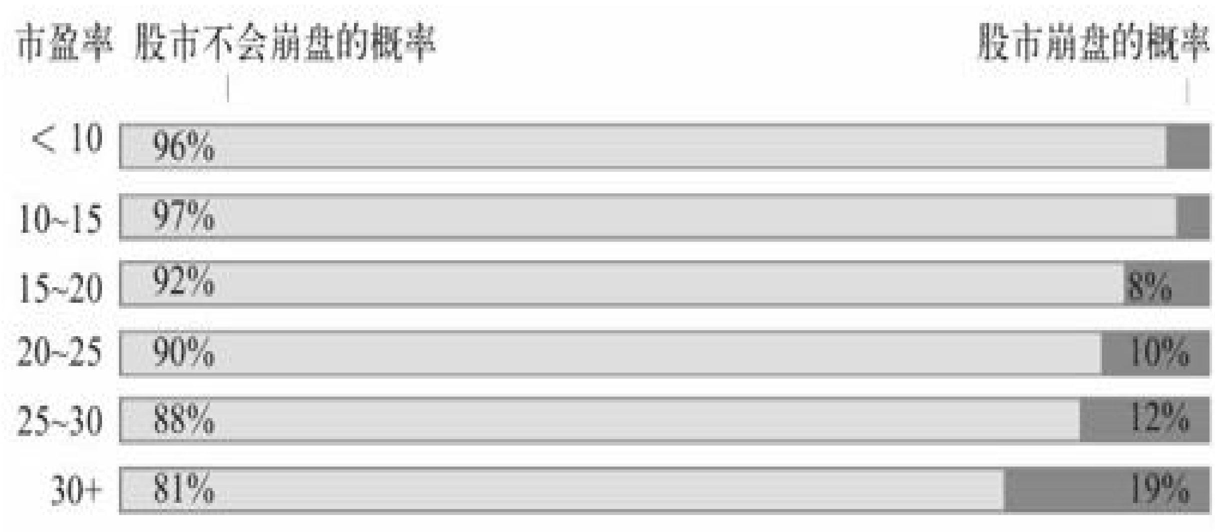
[illegible]——[illegible]——[illegible] Lifeminder.com [illegible] 400 [illegible]

[illegible]·[illegible] 1 021 [illegible]“[illegible]”[illegible] CEO[illegible]

[illegible]“[illegible] 90 [illegible] 90 [illegible]”

[illegible]——[illegible] 90 [illegible] 30[illegible] 90 [illegible] 4%[illegible]

[illegible] 19%[illegible] 11–8[illegible]


市盈率
股市不会崩盘的概率
股市崩盘的概率
< 10
96%
10~15
97%
15~20
92%
8%
20~25
90%
10%
25~30
88%
12%
30+
81%
19%

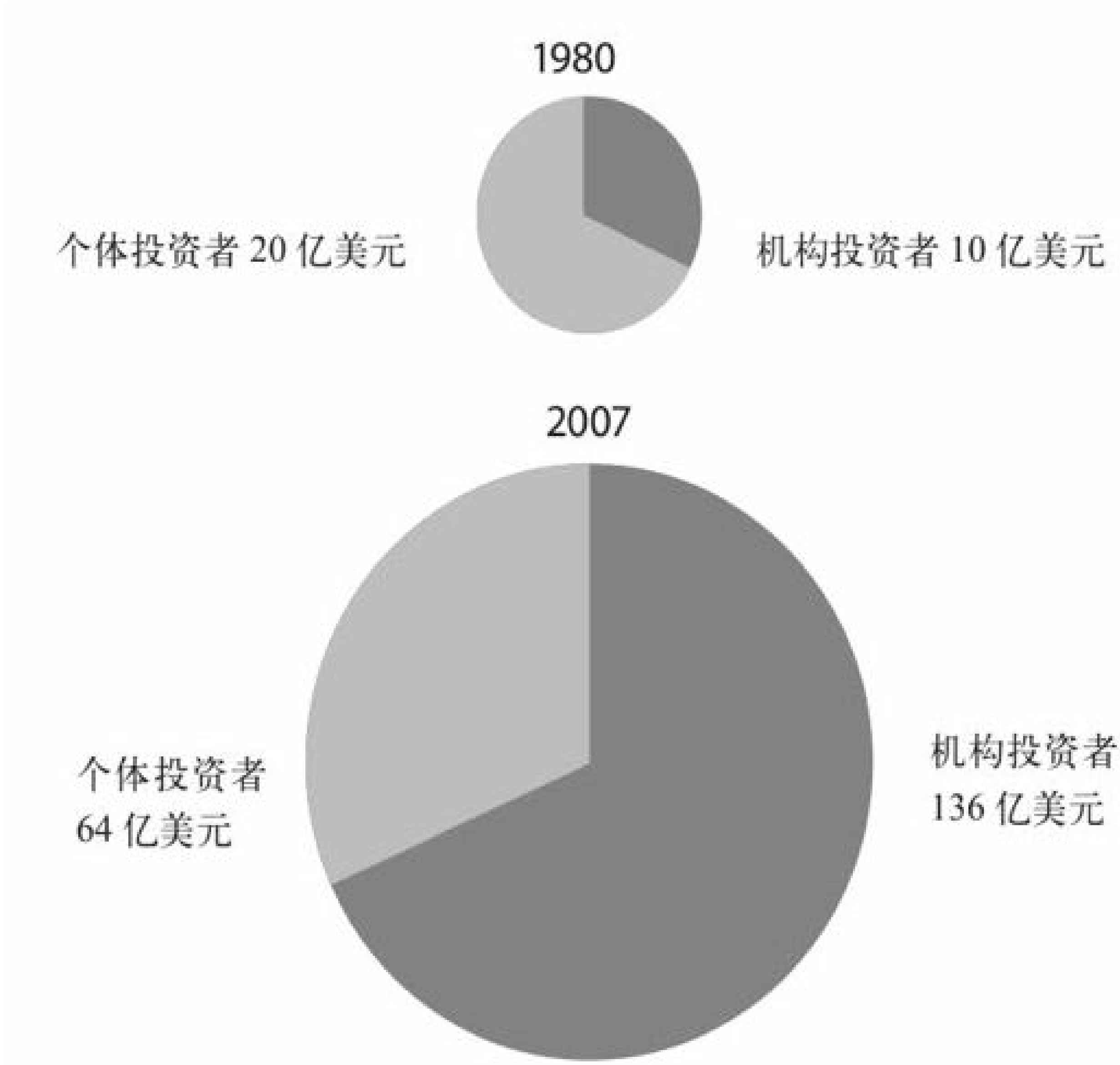
·[illegible]

[illegible] 20%[illegible] 50%[illegible]

[illegible]“[illegible]”[illegible]2001 [illegible] 10 [illegible]17 [illegible] 15 [illegible]“[illegible]”[illegible]“[illegible]”[illegible] 50%[illegible]“[illegible]”[illegible]“[illegible]”[illegible]·[illegible] 2000 [illegible] 4 [illegible] 22%[illegible]

[illegible]·[illegible]20 [illegible] 90 [illegible] 21 [illegible] 11–9[illegible]20 [illegible] 60 [illegible] 15%[illegible] 2007 [illegible] 68%[illegible]

[illegible]“[illegible]”



11-9

30% 50%

[illegible]——“[illegible]”[illegible]

[illegible] 20 [illegible] 80 [illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]——[illegible]2008 [illegible]Intrade. com [illegible]“[illegible]”[illegible]“[illegible]”[illegible] 4~6 [illegible]

[illegible]

[illegible]

[illegible]“[illegible]”

[illegible]“[illegible]”[illegible]

[illegible]

[illegible] 500 [illegible]

[illegible]·[illegible]

[illegible]

[illegible]

[illegible] 1999 [illegible] 3 [illegible] 2 [illegible] 27 [illegible] 500 [illegible] InfoSpace [illegible] 13 400 [illegible] InfoSpace [illegible] 482 [illegible] 240 000 [illegible] 20 [illegible]——[illegible] InfoSpace [illegible] 1.4 [illegible]——[illegible]

[illegible]·[illegible]·[illegible]“[illegible]”

[illegible]

[illegible]·[illegible]·[illegible] 3Com [illegible]3Com [illegible] Palm[illegible] 3Com [illegible] Palm [illegible] 3Com [illegible] Palm [illegible] 3Com [illegible] 3 [illegible] Palm [illegible] Palm [illegible] 3Com [illegible] 2/3 [illegible]

[illegible] Palm [illegible] 3Com [illegible] Palm [illegible] 3Com [illegible] 3Com [illegible] Palm [illegible] 3Com [illegible] Palm [illegible] 1 000 [illegible] 600 [illegible] 600 [illegible] 1 500 [illegible]

[illegible] Palm [illegible] Palm [illegible] 100%[illegible]

[illegible]

[illegible]“[illegible]‘[illegible]’[illegible]·[illegible]‘[illegible]’[illegible]”

[illegible]“[illegible]”[illegible]

[illegible]

[illegible]“[illegible]”[illegible] 3Com [illegible] Palm [illegible] Palm [illegible]

[illegible]——[illegible]——[illegible]

[illegible]

[illegible]“[illegible]”，1986 [illegible]·[illegible]“[illegible]”[illegible]

> [illegible]……[illegible]

[illegible]

[illegible]——[illegible]——[illegible]——[illegible]

[illegible] 100 [illegible]“[illegible] 100 [illegible]”[illegible]

[illegible]·[illegible]·[illegible] 750 [illegible] 17 [illegible] 0.5%[illegible]

[illegible]

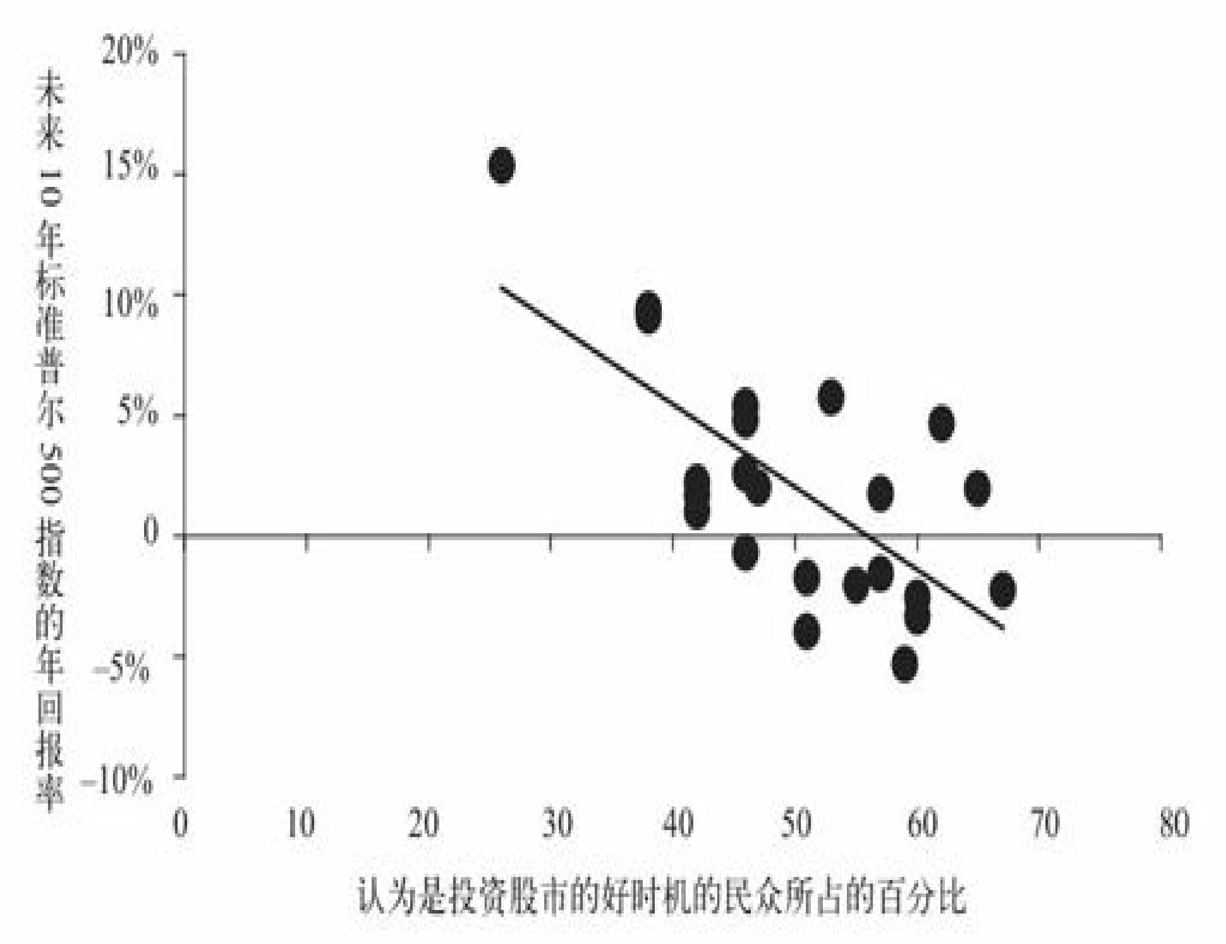
[illegible]

[illegible]“[illegible]”[illegible]

[illegible]·[illegible] 500 [illegible]·[illegible]

[illegible]·[illegible]“[illegible] 25 [illegible] 900 [illegible] 5 000 [illegible]”

[illegible]“[illegible]”[illegible]2000 [illegible] 1 [illegible] 67%[illegible]1990 [illegible] 2 [illegible] 26%[illegible] 10 [illegible] 500 [illegible] 3 [illegible] 11–10[illegible]

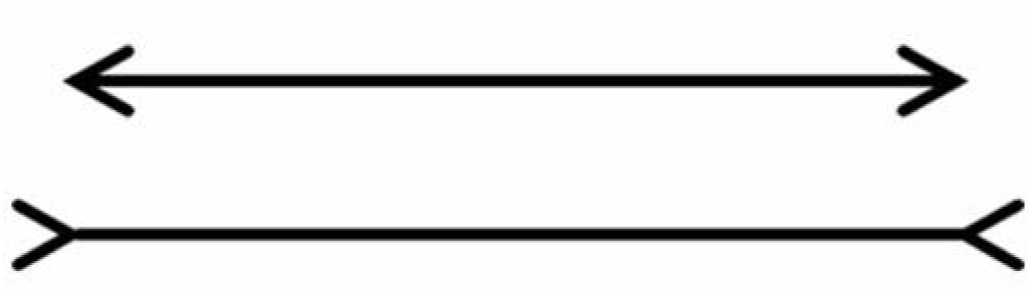


[illegible] **11-10** [illegible]

[illegible]“[illegible]‘[illegible]’[illegible]”[illegible]“[illegible]”

[illegible] 1970 [illegible] 500 [illegible] 10 000 [illegible] 2009 [illegible] 40 [illegible] 63 000 [illegible]“[illegible]”[illegible] 25%[illegible] 90%[illegible] 18 000 [illegible]——[illegible] 2.6%[illegible]

[illegible]CNBC[illegible]……[illegible]……[illegible]……[illegible]



[illegible]

[illegible]

[illegible]·[illegible]“[illegible]”[illegible] 6.5 [illegible]

[illegible]·[illegible]

[illegible]——[illegible] 10%[illegible]

[illegible] 50%[illegible]

[illegible]——[illegible]——[illegible]

[illegible]

[1]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[2][illegible]

[3][illegible] 7%[illegible] 120 [illegible]——[illegible]——[illegible] 120 [illegible]——[illegible] 3%~10% [illegible] 7%[illegible]“[illegible]”——[illegible]——[illegible]20 [illegible] 7% [illegible]

[4][illegible]——[illegible]

[illegible]

[illegible] 10 [illegible]

1988 [illegible] 6 [illegible] 23 [illegible] 37.8 [illegible]·[illegible]

[illegible] 20 [illegible] 50 [illegible] 0.4 [illegible]“[illegible] 1%[illegible] 99%[illegible]”

[illegible]“[illegible]”[illegible]“[illegible]”

[illegible] 25 [illegible]“[illegible]”[illegible]

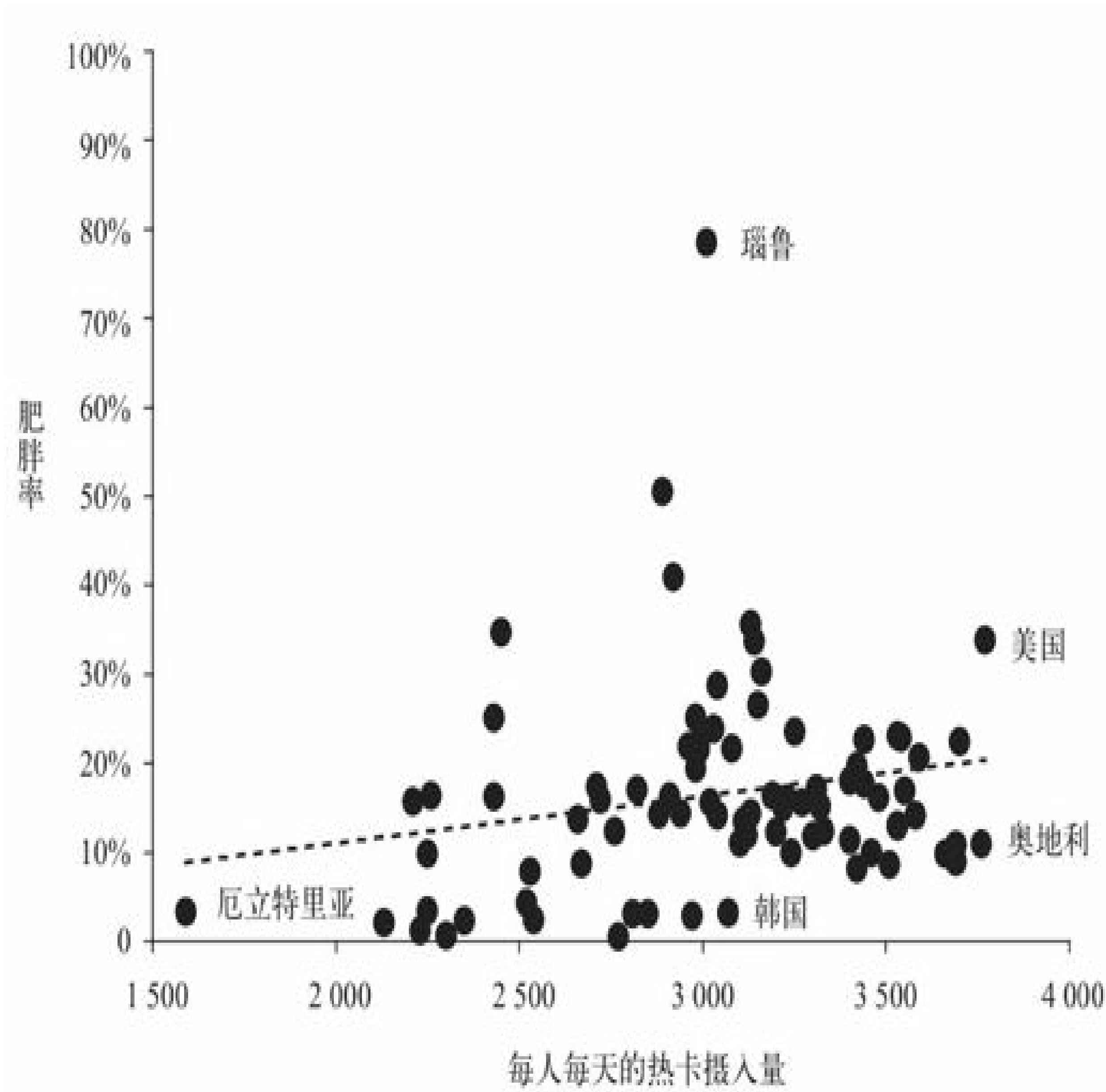
[illegible]

[illegible]

[illegible]1997 [illegible]

[illegible]

[illegible] 84 [illegible] 3 070 [illegible] 3%[illegible] 79%[illegible] 84 [illegible] 12–1[illegible]“[illegible]”[illegible]



100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0
肥胖率
瑙鲁
美国
奥地利
厄立特里亚
韩国
1 500
2 000
2 500
3 000
3 500
4 000
每人每天的热卡摄入量

[illegible] 12-1 84 [illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

1990 [illegible]IPCC[illegible]“[illegible]”[illegible] 1 000 [illegible]

[illegible] 150 [illegible]

[illegible]

[illegible]

[illegible]——[illegible]——[illegible]30%[illegible] 18 [illegible]

[illegible] 460 [illegible]

[illegible] 1 [illegible] 27 [illegible] 400 [illegible] 200 [illegible]

[illegible]

[illegible]——[illegible]——[illegible]

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[illegible]“[illegible]”[illegible]·[illegible] 1824 [illegible]·[illegible] 1859 [illegible]·[illegible]

[illegible]19 [illegible]“[illegible]·[illegible]”[illegible]

[illegible] 3 [illegible]

[illegible] 19 [illegible]

[illegible]·[illegible] 1897 [illegible]

[illegible]20 [illegible] 80 [illegible]“[illegible]”[illegible]“[illegible]”[illegible] 5 [illegible]“[illegible]”[illegible] 20 [illegible] 90 [illegible]“[illegible]”[illegible] 1/6[illegible]“[illegible]”[illegible] 1/10[illegible]“[illegible]”[illegible]

[illegible]——[illegible]——[illegible]

[illegible]2012 [illegible] 1 [illegible]“[illegible]”[illegible] 16 [illegible]

[illegible]

[illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

2009 [illegible] 12 [illegible] 4 [illegible]

[illegible] 20 [illegible] 60 [illegible]
20 [illegible] 60 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]·[illegible]

[illegible]“[illegible]‘[illegible]’[illegible]”

[illegible]“[illegible]”[illegible]3 [illegible]

[illegible]

[illegible] 2011 [illegible] 3 [illegible] 5 [illegible]“[illegible]”[illegible]

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[illegible]“[illegible]”

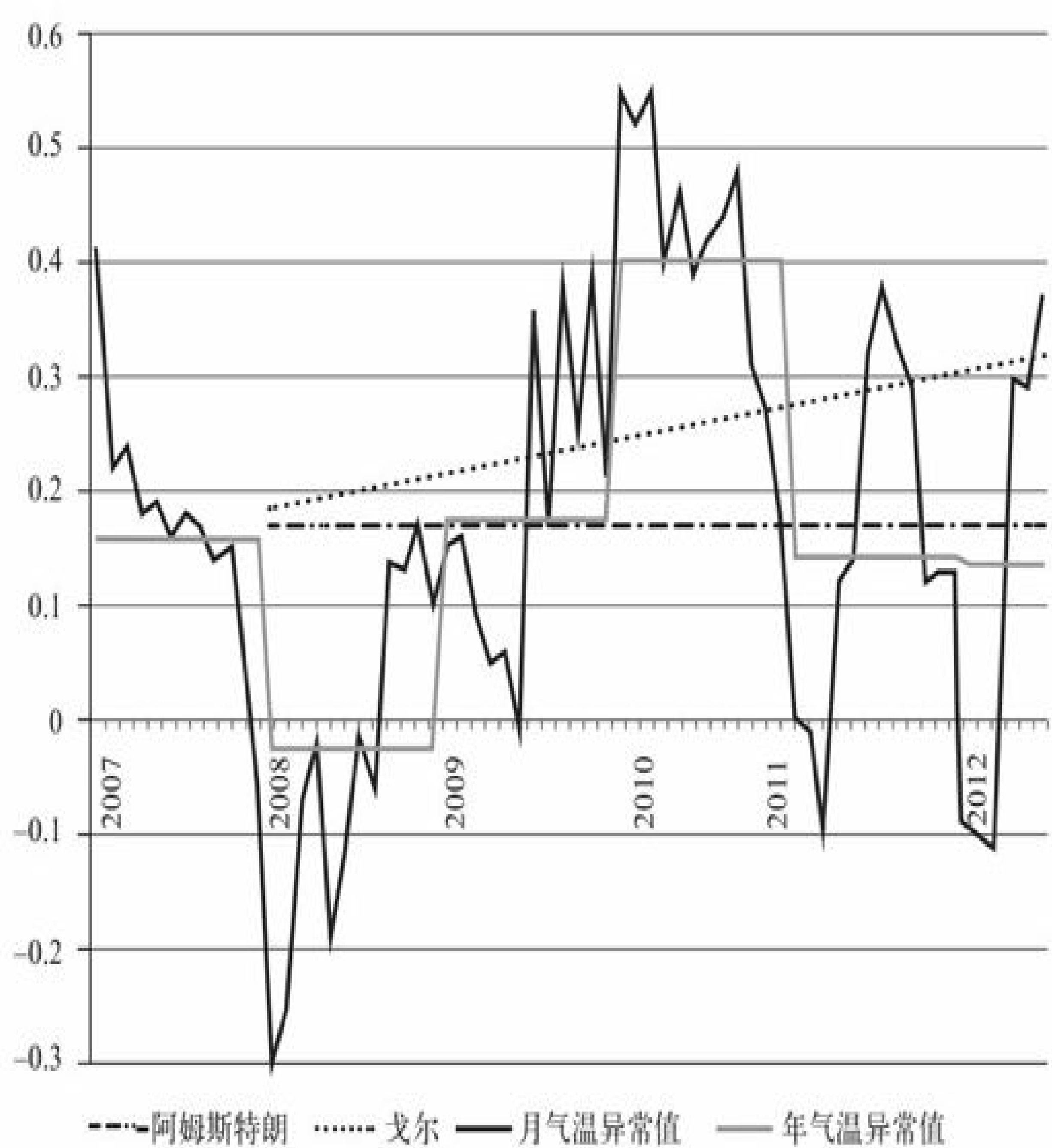
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2007 [illegible]·[illegible]“[illegible]”[illegible]——[illegible] 2007 [illegible]——[illegible] 2012 [illegible] 1 [illegible]“[illegible]”[illegible] 47 [illegible] 29 [illegible]“[illegible]”[illegible]

[illegible]“[illegible] 150 [illegible]”

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0.6
0.5
0.4
0.3
0.2
0.1
0
–0.1
–0.2
–0.3
2007
2008
2009
2010
2011
2012
阿姆斯特朗
戈尔
月气温异常值
年气温异常值

[illegible] 12-2 [illegible]

[illegible] 89 [illegible] 72 [illegible] 89 [illegible]

[illegible]“[illegible]”

[illegible]“[illegible]”

[illegible]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible]

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[illegible]“[illegible]”[illegible]

[illegible]

[illegible]“[illegible]”

[illegible]

[illegible] 20 [illegible]

[illegible]

[illegible]·[illegible]“[illegible]”

[illegible]“[illegible]

[illegible]”

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]——[illegible]——[illegible] 2006 [illegible]“[illegible]”[illegible]

[illegible] 2008 [illegible]94%[illegible] 84%[illegible]“[illegible]”[illegible] 19%[illegible] 50 [illegible]

[illegible]·[illegible]

[illegible]“[illegible]”

[illegible]

[illegible] 24 [illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible] 2062 [illegible] 11 [illegible] 22 [illegible]

[illegible]

[illegible] 10 [illegible] 20 [illegible]“[illegible]”[illegible]

[illegible] 80~100 [illegible]

[illegible]

[illegible] 54—1814 [illegible]

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[illegible]

[illegible] 30 [illegible]

[illegible]

[illegible]20 [illegible] 80 [illegible] 3 [illegible]
48 [illegible]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible] SIR [illegible]

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[illegible] 3 [illegible]

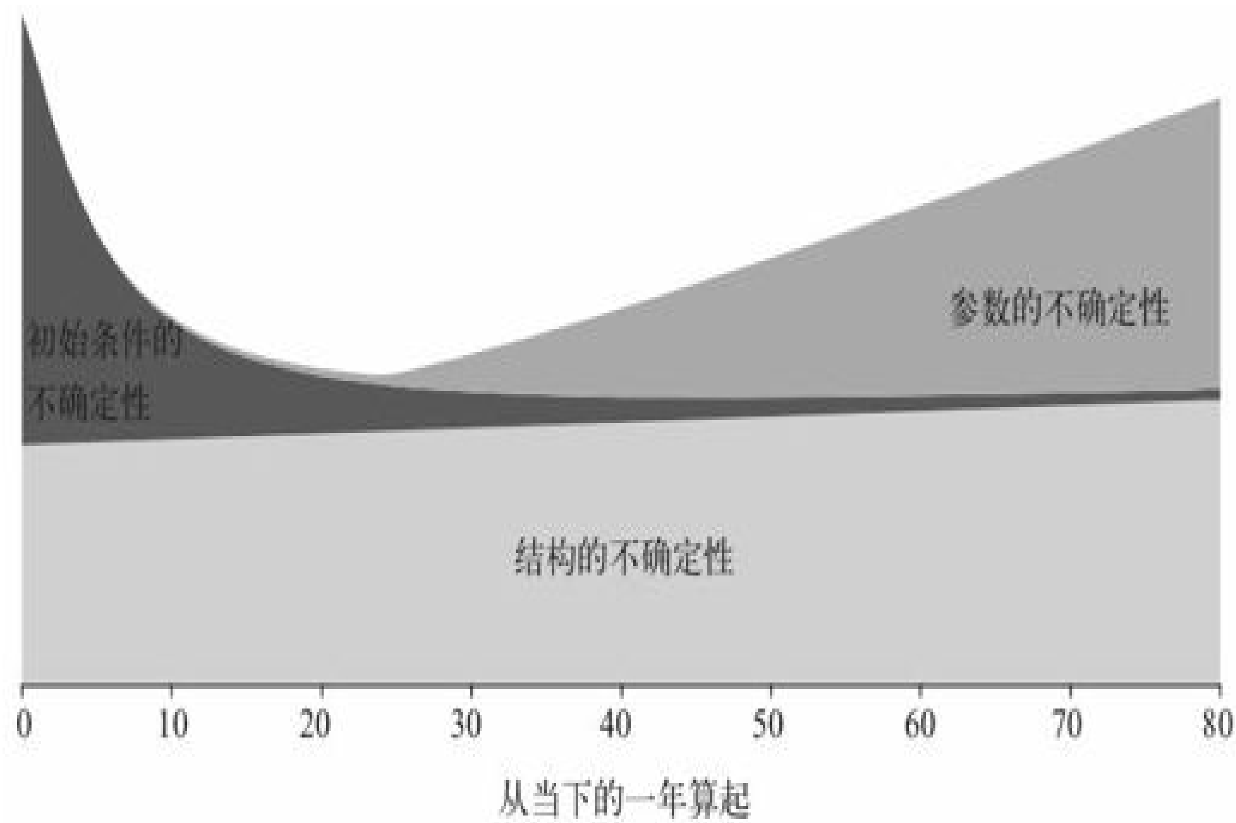
[illegible] 1990 [illegible] 3 [illegible]“[illegible]”[illegible]“[illegible]”[illegible] 159 [illegible]“[illegible]”[illegible] 66%[illegible]“[illegible]”[illegible] 99%[illegible]

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[illegible] 12–3 [illegible] 3 [illegible]



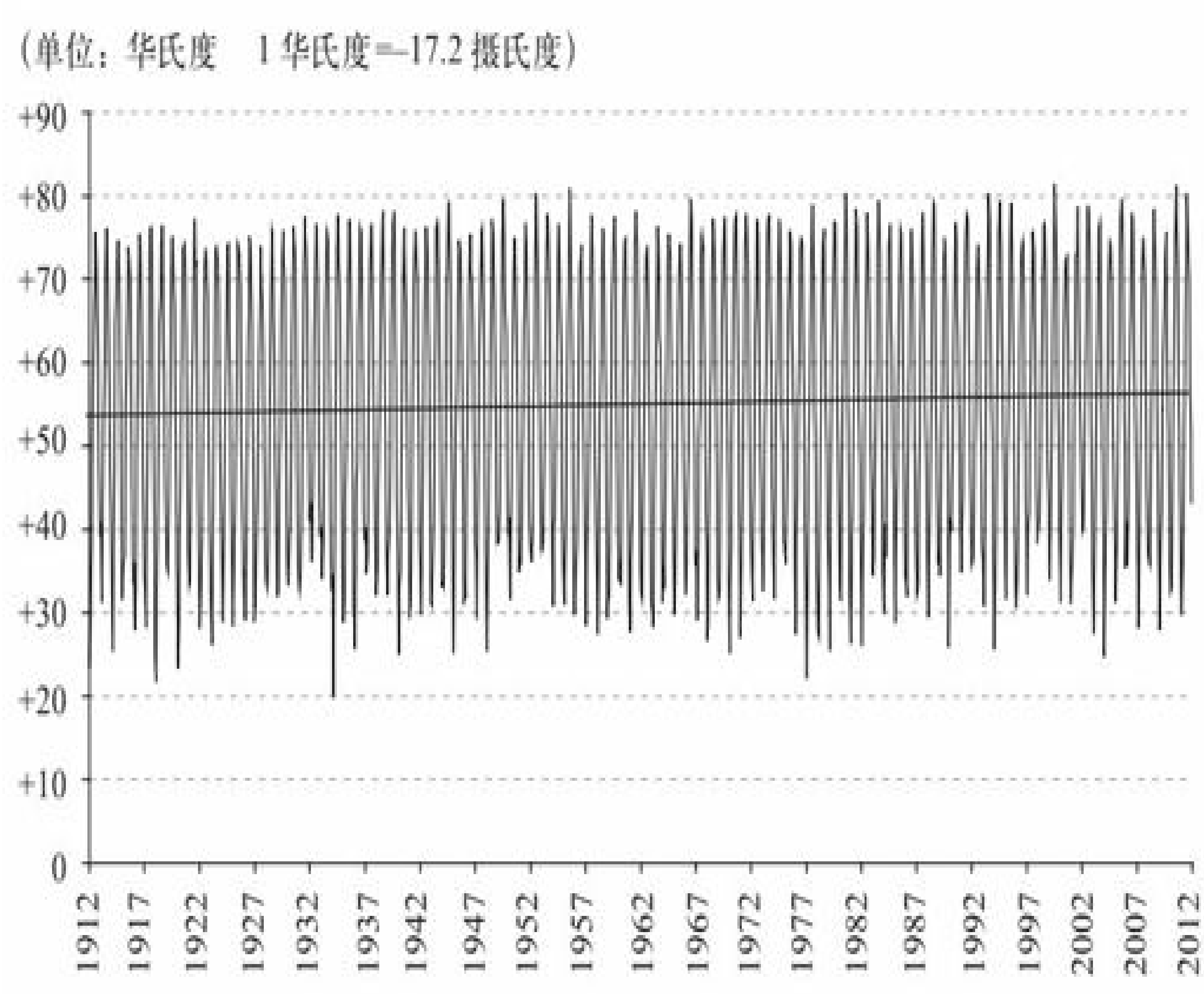
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[illegible]

[illegible]

[illegible]

[illegible]



[illegible] 12-4 1912-2012 [illegible]

[illegible] 1~10 [illegible]“ENSO [illegible]”[illegible]–[illegible] 3 [illegible] ENSO [illegible]

[illegible] 11 [illegible] 2012 [illegible] 2013 [illegible] 17 [illegible] 18 [illegible] 70 [illegible]

[illegible] 1991 [illegible] 0.2 [illegible] 10 [illegible]

[illegible] 1~10 [illegible]

[illegible] 30 [illegible]“[illegible]”

[illegible] 50 [illegible] 100 [illegible]

[illegible]

[illegible] 3 [illegible] 20~25 [illegible] 3 [illegible] ENSO [illegible]

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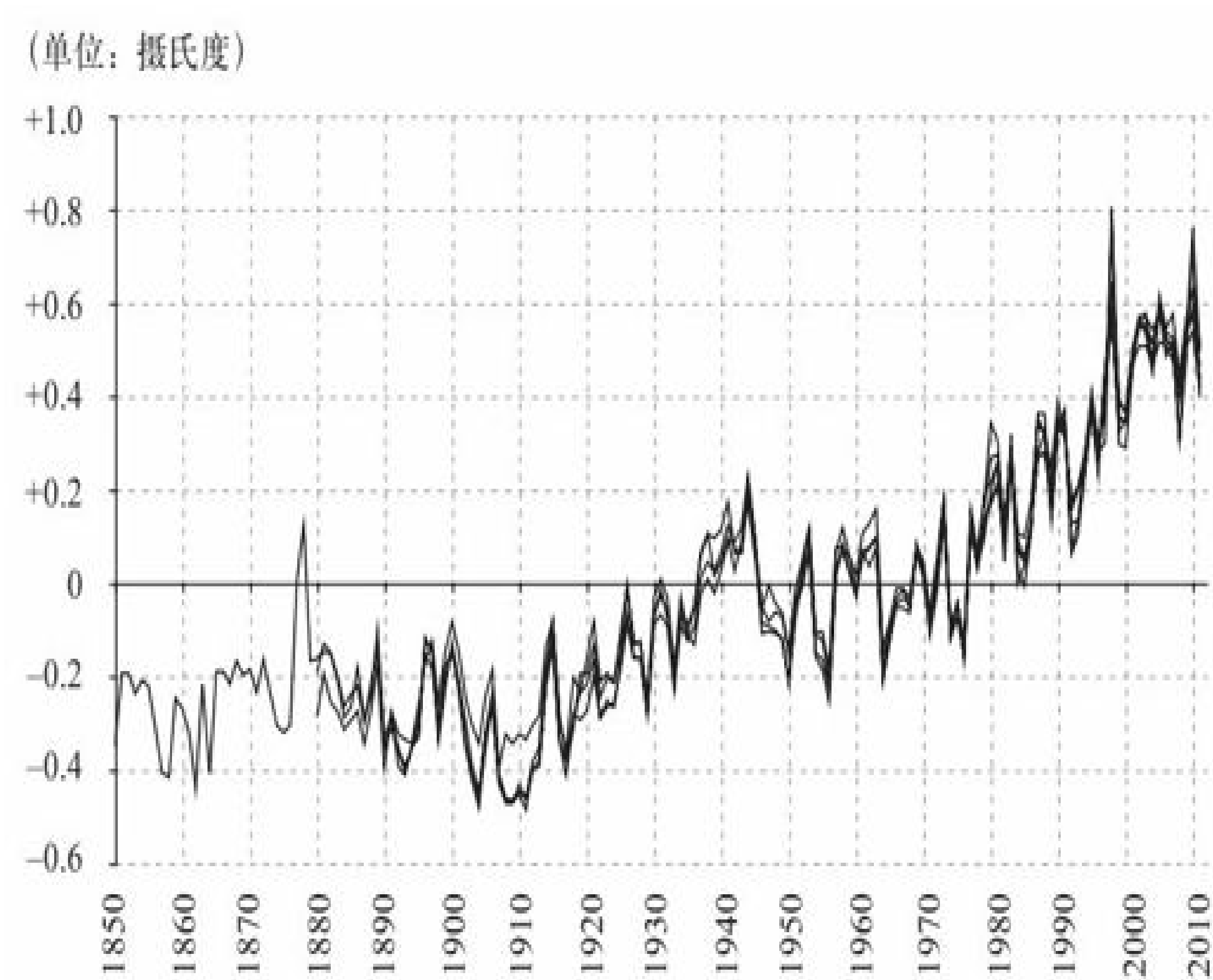
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[illegible] 4 [illegible] 4 [illegible]

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[illegible] 1850 [illegible] 1979 [illegible]
1951~1980 [illegible] 30 [illegible] 20 [illegible]

[illegible] 12–5 [illegible]1998 [illegible] 2010 [illegible] 20 [illegible] 50 [illegible]



[illegible] 12-5 [illegible] 1951-1980 [illegible]

1981 [illegible] 6 [illegible] 2011 [illegible]

[illegible] 1988 [illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible] 1950~1980 [illegible] 30 [illegible] 20 [illegible] 90 [illegible] 55%~70%[illegible] 33%[illegible]

[illegible]20 [illegible] 90 [illegible] 10 [illegible] 6 [illegible]“[illegible]”[illegible] 12–1[illegible]21 [illegible] 10 [illegible] 2012 [illegible]

[illegible] 12–1 [illegible]

[illegible]33%

[illegible]1988 [illegible]20 [illegible] 90 [illegible] 55%~70%				
[illegible]	[illegible] 1 [illegible] =–17.2 [illegible]	1990~1999 [illegible]	2000~2011 [illegible]	1990~2011 [illegible]
[illegible]	86.2	60%	58%	59%
[illegible]	86.2	10%	42%	27%
[illegible]	81.4	80%	75%	77%
[illegible]	89.3	50%	67%	59%
[illegible]		50%	61%	56%

[illegible] 3 [illegible]“[illegible]”[illegible]20 [illegible] 90 [illegible]“[illegible]”[illegible] 33%[illegible] 10 [illegible] 8 [illegible]“[illegible]”[illegible]

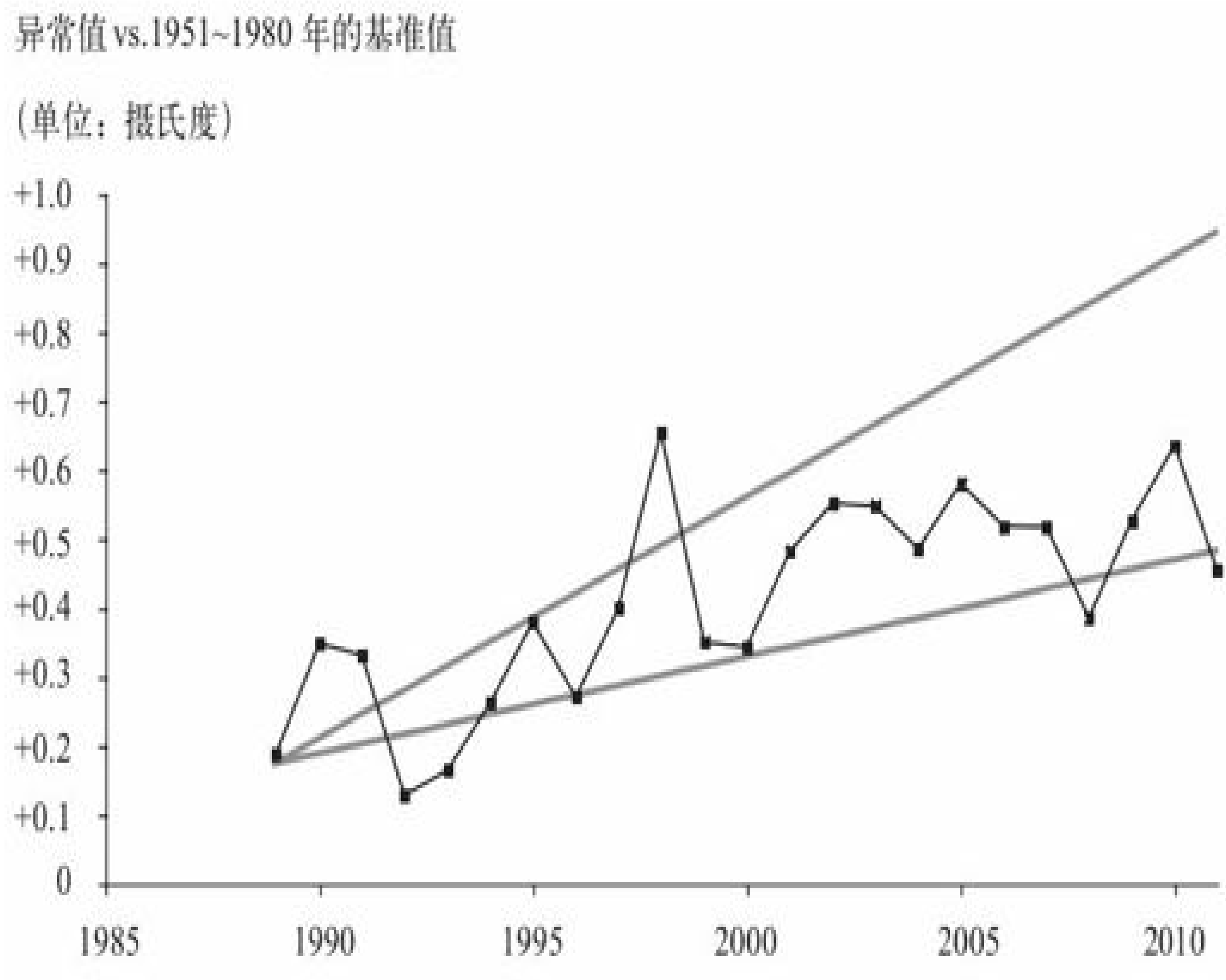
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[illegible] 100 [illegible] 5 [illegible] 2 [illegible] 3 [illegible]

[illegible] 12–6[illegible] 1990~2011 [illegible] 0.015 [illegible] 100 [illegible] 1.5 [illegible] 1/2[illegible]



[illegible] 12-6 1990-2011 [illegible] VS.1990 [illegible]

[illegible]

[illegible]“[illegible]”[illegible] 2010 [illegible] 400PPM[illegible]2010 [illegible] 390PPM[illegible]——[illegible]

[illegible]1995 [illegible]“[illegible]”[illegible] 1.8 [illegible]“[illegible]”[illegible]

[illegible] 1990 [illegible] 5 [illegible]1995 [illegible]

[illegible]

[illegible]·[illegible]

“[illegible]”[illegible]

[illegible]

[illegible]20 [illegible] 70 [illegible]

[illegible]1975 [illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

2011 [illegible] 10 [illegible]“[illegible]”[illegible]

[illegible] 10 [illegible]

20 [illegible] 70 [illegible] 20 [illegible] 90 [illegible] 1995 [illegible] 1991 [illegible]

[illegible] 12–7 [illegible] 20 [illegible] 70 [illegible] 1970 [illegible]20 [illegible]

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[illegible] 12-7 1900-2005 [illegible]

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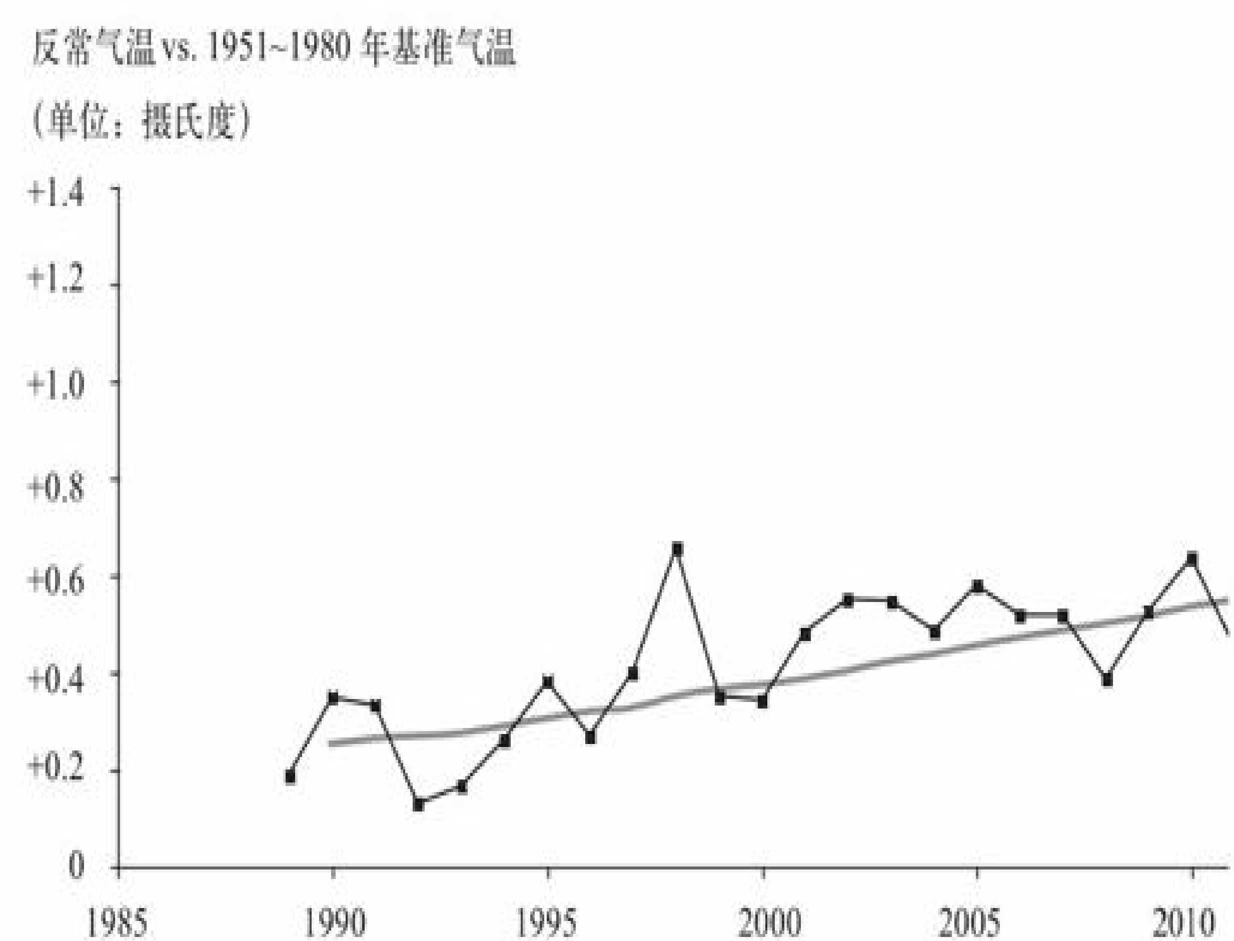
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[illegible]

[illegible]

[illegible] ENSO [illegible]

[illegible] 1850~1989 [illegible] 1990 [illegible] 1.5 [illegible] 12–8 [illegible]



[illegible] 12-8 1990-2011 [illegible] VS.[illegible]

[illegible]“[illegible]”[illegible] 100%[illegible] 1938 [illegible] G·S·[illegible] 2~3 [illegible]

[illegible] 1990 [illegible] 1.1~1.7 [illegible] 0.015 [illegible] 1.5 [illegible]

[illegible]·[illegible] 1981 [illegible] 1988 [illegible]

[illegible]

[illegible]“[illegible]”[illegible]2007 [illegible] 20 [illegible]“[illegible]”[illegible] 2007 [illegible] 2007 [illegible] 1987 [illegible]1947 [illegible] 1907 [illegible]

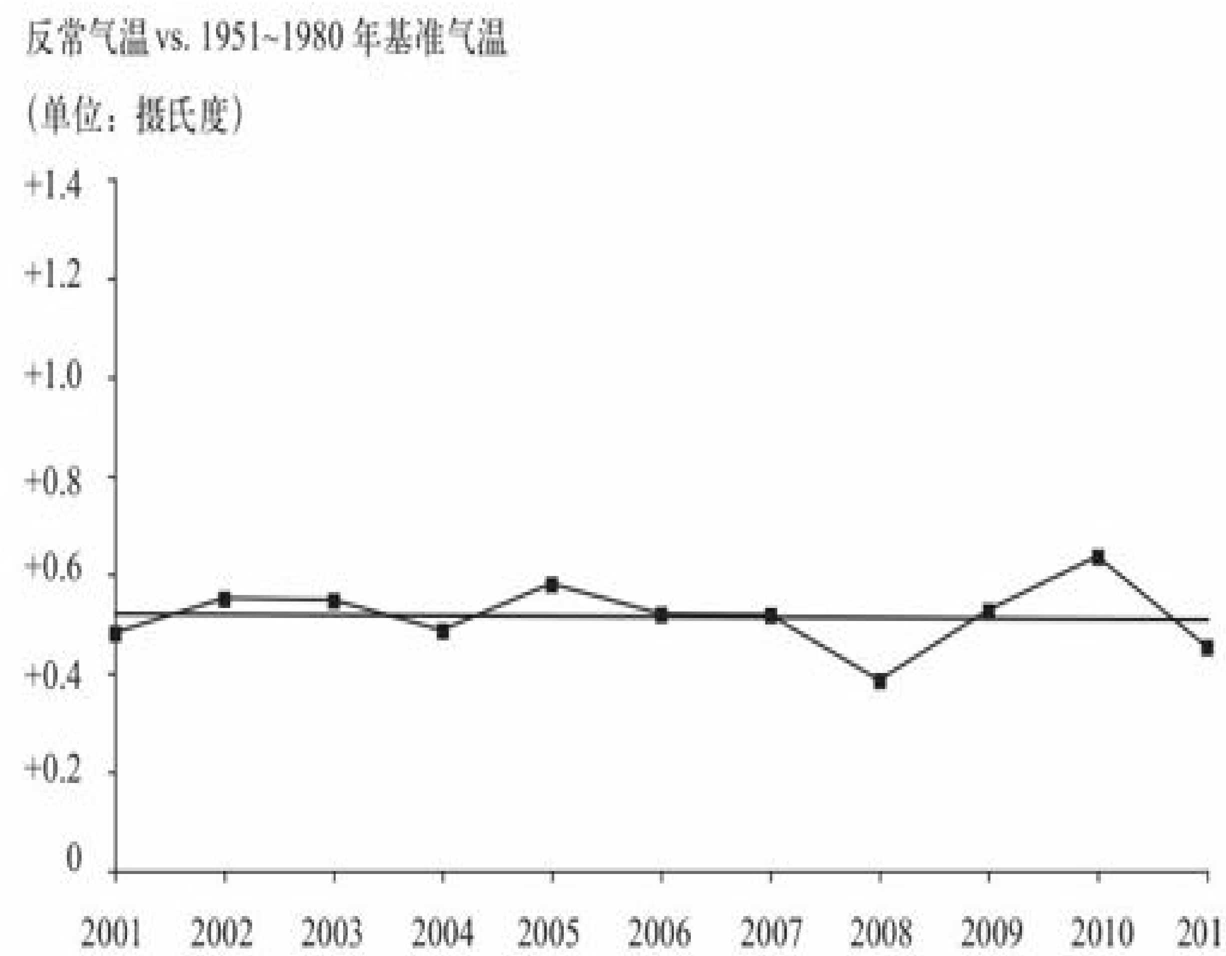
[illegible]“[illegible]”[illegible]“[illegible]”[illegible] 2011 [illegible]“[illegible]”

[illegible]

[illegible]

[illegible]“[illegible]”[illegible] 2007 [illegible]2011 [illegible] 2007 [illegible]

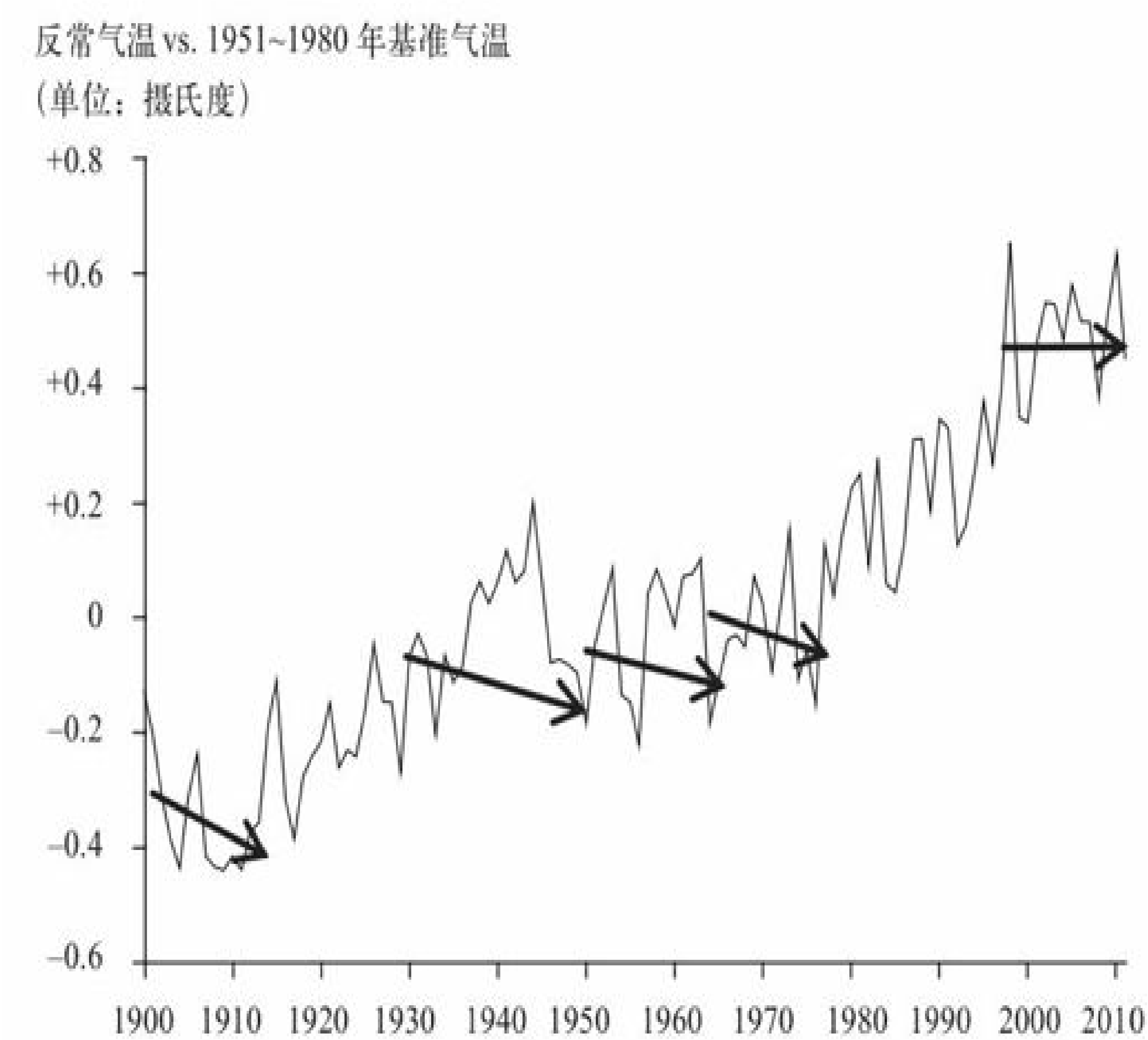
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[illegible] 12-9 2001-2011 [illegible]

[illegible] ENSO [illegible] 1998 [illegible]“[illegible]”[illegible]2008~2018 [illegible] 10 [illegible]“[illegible]”[illegible] 2008 [illegible]

[illegible] 2001~2011 [illegible] 10 [illegible] 1894~1913 [illegible]1937~1956 [illegible]1966~1977 [illegible] 12–10[illegible]



[illegible] 12-10 1900-2011 [illegible]

[illegible]2001~2011 [illegible] 10 [illegible]

[illegible]

[illegible]“[illegible] 1850~2007 [illegible] 100 [illegible]”[illegible]“[illegible] 10 [illegible] 10 [illegible] 100:1 [illegible]”

[illegible]——[illegible] 10 [illegible] 1900 [illegible] 75%[illegible] 25%[illegible] 100:1 [illegible] 2PPM[illegible] 10 [illegible] 15%[illegible]

[illegible] NBA [illegible]

[illegible]

[illegible] 2001 [illegible] 95%[illegible]

[illegible] 10 [illegible] 2001~2011 [illegible]

[illegible] 10 [illegible] 15%[illegible] 50%[illegible] 10 [illegible] 12–2[illegible] 10 [illegible] 95%[illegible] 85%[illegible]

12–2 [illegible]——[illegible]

[illegible]		
[illegible]	x	95%
[illegible] 10 [illegible]		
[illegible] 10 [illegible]	y	15%
[illegible] 10 [illegible]	z	50%
[illegible]		
[illegible] 10 [illegible]	xy xy [illegible] z[illegible]1 [illegible] x[illegible]	85%

[illegible] 10 [illegible] 1%[illegible] 28%[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] 4 [illegible]·[illegible]“[illegible]”[illegible]·[illegible]

[illegible]·[illegible]

[illegible]·[illegible]

[illegible]·[illegible]“[illegible]”

“[illegible]”

[illegible] RealClimate.org [illegible]·[illegible]“[illegible]”[illegible]

[illegible]·[illegible]“[illegible]”

[illegible]·[illegible]“[illegible]”[illegible] Real–Climate.org [illegible]“[illegible]”[illegible] Watts Up With That.com [illegible]“[illegible]”[illegible]

[illegible]

[illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]193 [illegible]

[illegible]·[illegible]“[illegible]”

[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible] 20 [illegible] 70 [illegible] 2011 [illegible] 100 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]“9·11”[illegible]

[illegible]· [illegible]·[illegible] 12 [illegible] 7 [illegible]“[illegible]”[illegible]1941 [illegible] 12 [illegible] 7 [illegible]“[illegible]”[illegible] 60 [illegible]

[illegible]1941 [illegible] 11~12 [illegible]

[illegible]“[illegible]”[illegible]PURPLE[illegible] 97%[illegible]

[illegible] 1941 [illegible] 11 [illegible]20 [illegible] 40 [illegible] 483~644 [illegible] 6 [illegible]

[illegible]

[illegible]1941 [illegible] 12 [illegible] 4 [illegible] 165 [illegible] 45 [illegible]3 [illegible] 2 400 [illegible]4 [illegible]

1941 [illegible] 12 [illegible] 8 [illegible] 470:1 [illegible]

[illegible]

2001 [illegible] 9 [illegible] 11 [illegible] 77 [illegible] 59 [illegible]·[illegible] 125 [illegible]1941 [illegible] 12 [illegible] 7 [illegible] 8 [illegible]

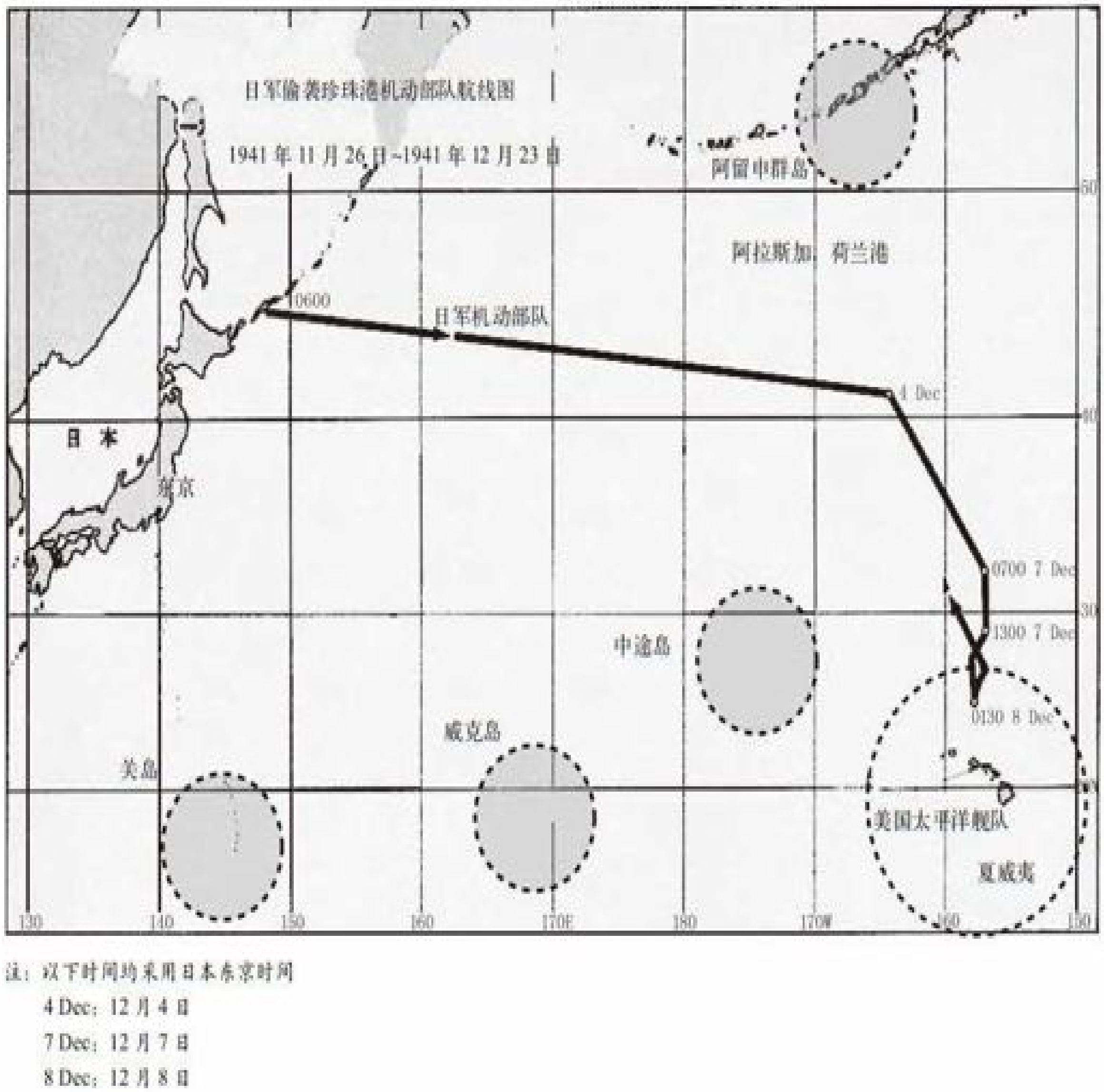


图 **13-1** [illegible]

2012 [illegible] 3 [illegible] 1.73 [illegible] 80 [illegible] 4 [illegible] 1975~1977 [illegible] 25 [illegible]

[illegible]——[illegible]·[illegible]·[illegible] 1962 [illegible]

[illegible]“[illegible]”

[illegible]“[illegible]”[illegible] 8 [illegible]

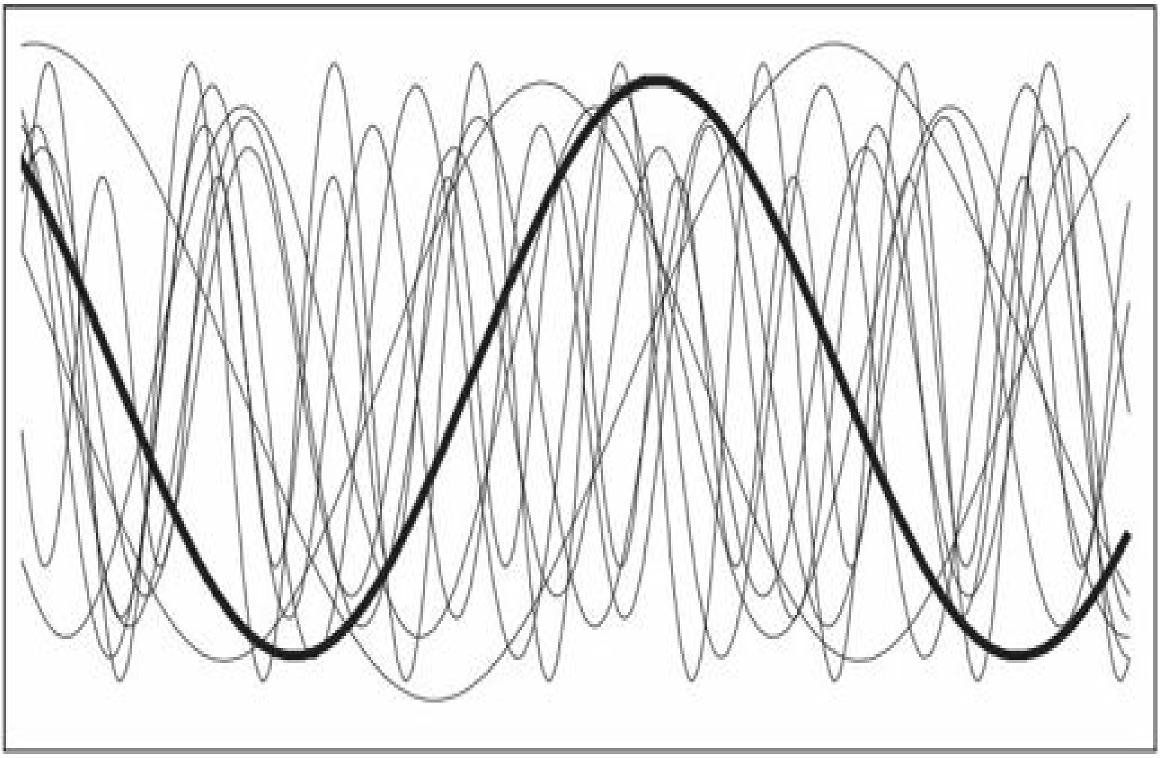
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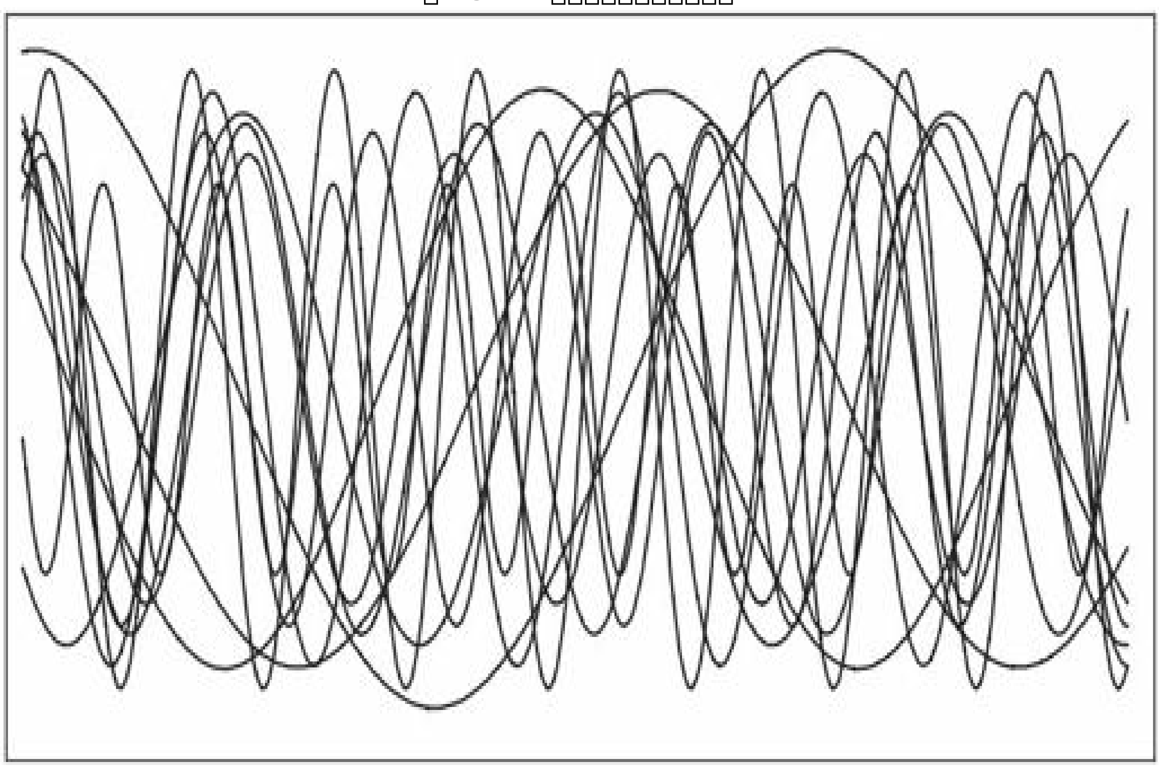
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[illegible] 13–2A [illegible] 13–2B [illegible]

[illegible]“[illegible]”[illegible]



[illegible] 13-2A [illegible]



[illegible] 13-2 [illegible]B [illegible]

[illegible]“[illegible]”[illegible]“9·11”[illegible]

[illegible]

[illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]

[illegible]·[illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]

[illegible]“9·11”[illegible]“[illegible]”[illegible]

[illegible]6212 [illegible]7765 [illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]

“9·11”[illegible]“[illegible]”[illegible]

[illegible]

[illegible]·[illegible]

[illegible]“[illegible]”[illegible] 2002 [illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”，2011 [illegible]

[illegible]“[illegible]”[illegible]

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[illegible]

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[illegible]“[illegible]”[illegible]“9·11”[illegible]

·[illegible] 1994 [illegible]，1998 [illegible]“[illegible]”[illegible]

·[illegible]，1993 [illegible]“[illegible]”[illegible]·[illegible] 6 [illegible]

·[illegible]“[illegible]”[illegible]，1998 [illegible] 224 [illegible]，2000 [illegible]“[illegible]”[illegible]

·2001 [illegible] 7 [illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]·[illegible]

·[illegible]·[illegible] 2001 [illegible] 8 [illegible] 16 [illegible]——[illegible]——[illegible] 50 [illegible] 747 [illegible]

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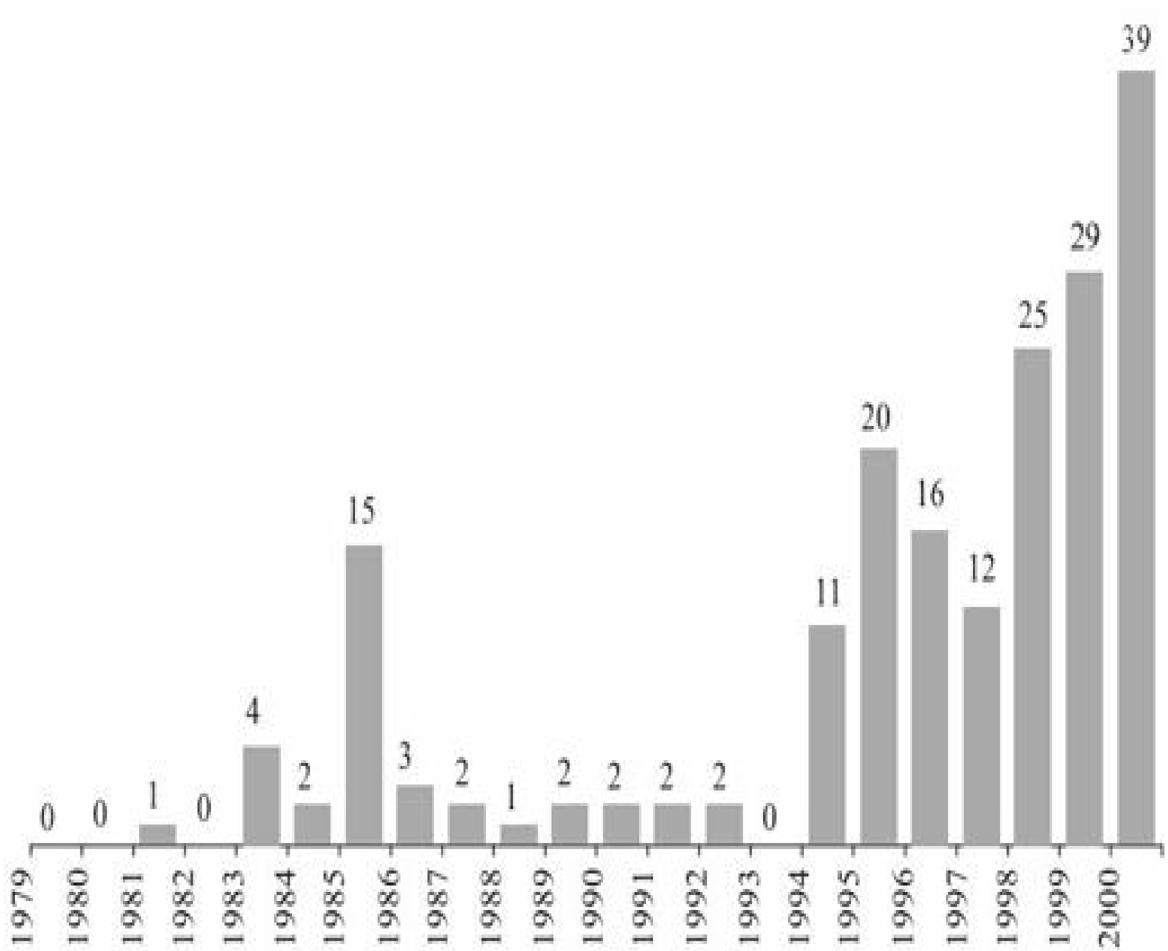
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[illegible]

[illegible]“[illegible]”[illegible]“9·11”[illegible]20 [illegible] 80 [illegible] 31 [illegible] 21 [illegible] 2000 [illegible] 39 [illegible]“[illegible]”[illegible]

[illegible]·[illegible]“[illegible]”[illegible]——[illegible]——[illegible]



[illegible] 13-3 1979-2000 [illegible]

“[illegible]”[illegible]“[illegible]”

“9·11”[illegible]“9·11”[illegible]

[illegible]“[illegible]‘9·11’[illegible]”

[illegible]“[illegible]‘[illegible]’[illegible]‘9·11’[illegible]‘9·11’[illegible]”

[illegible]“9·11”[illegible]——2 977 [illegible]——[illegible]“[illegible]”[illegible]·[illegible]“9·11”[illegible]

“9·11”[illegible] 1985 [illegible] 329 [illegible]“9·11”[illegible] 1/10[illegible]“9·11”[illegible] 1995 [illegible]

[illegible]——[illegible]·P·[illegible]
168 [illegible]

[illegible]“9·11”[illegible]“9·11”[illegible]

[illegible]

[illegible]

2008 [illegible]——[illegible] 2008 [illegible]——[illegible]

[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]

[illegible]——[illegible]——[illegible]

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[illegible]“[illegible]”[illegible]

[illegible]

[illegible] 30 [illegible]·[illegible]“[illegible]”[illegible] 30 [illegible]“[illegible]”[illegible]

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[illegible]4 [illegible]5 [illegible] 6 [illegible] 7 [illegible] 6 [illegible]

[illegible] 5 [illegible] 6 [illegible]

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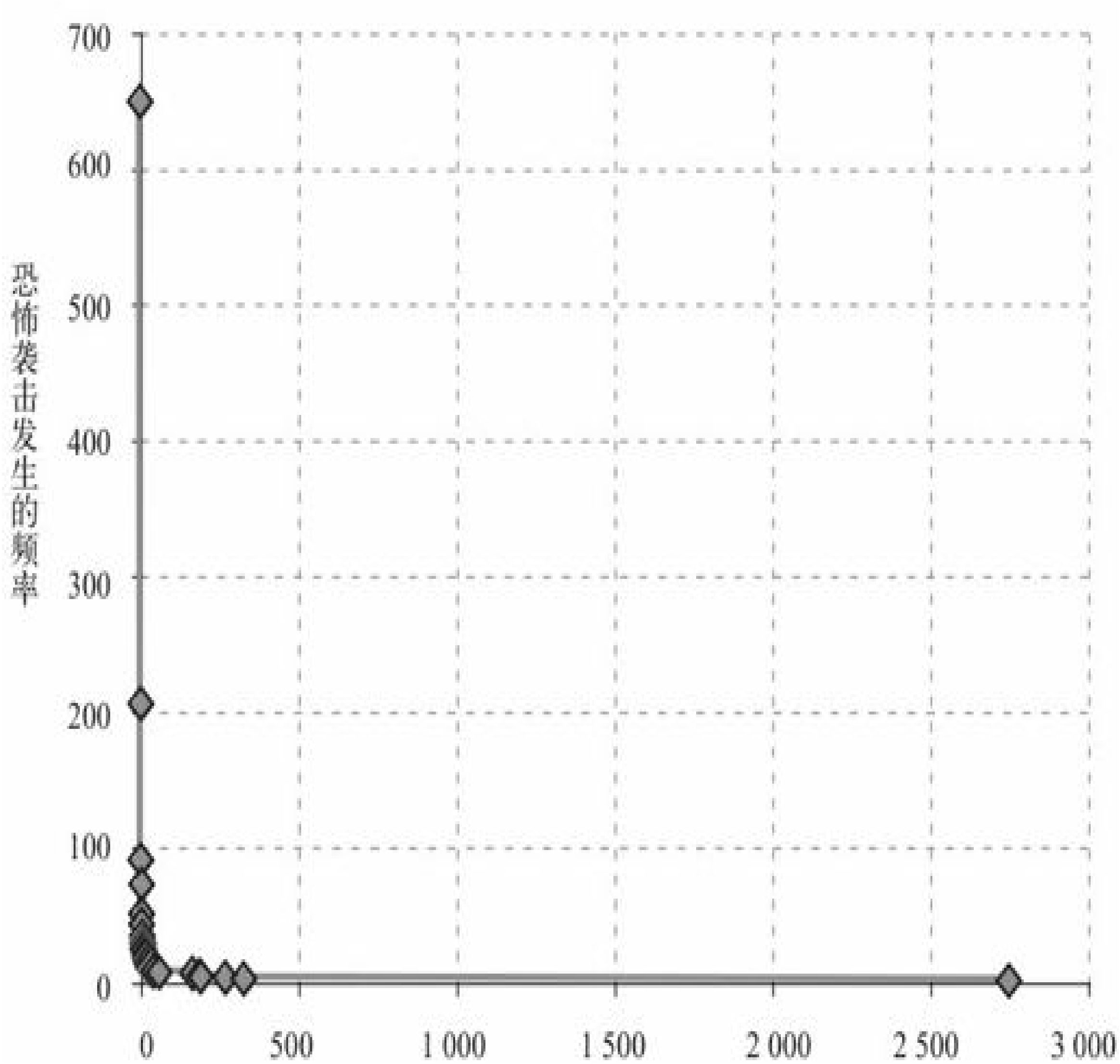
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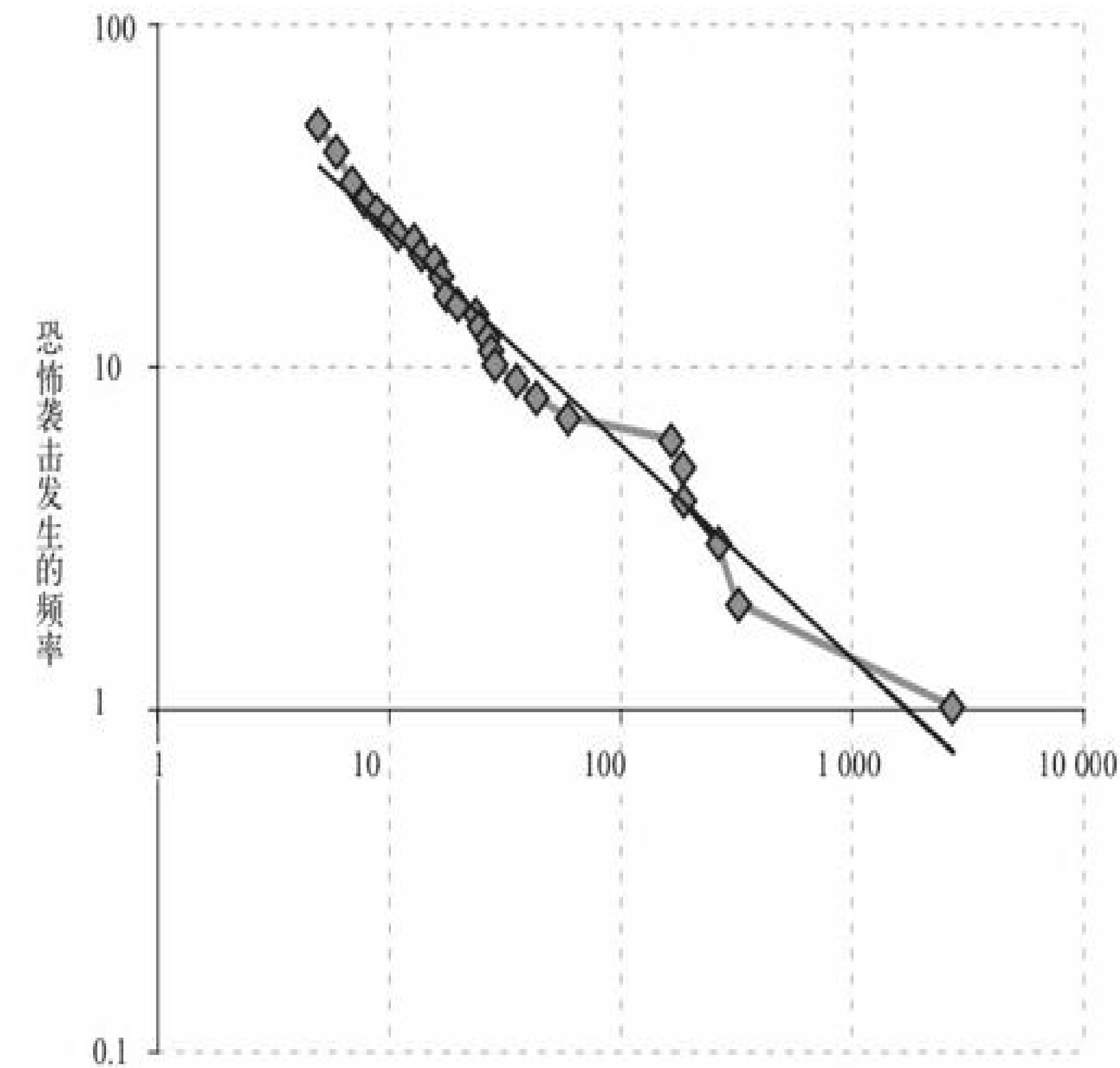
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[illegible] 13-4 1979-2009 [illegible]

[illegible] 13–5 [illegible]

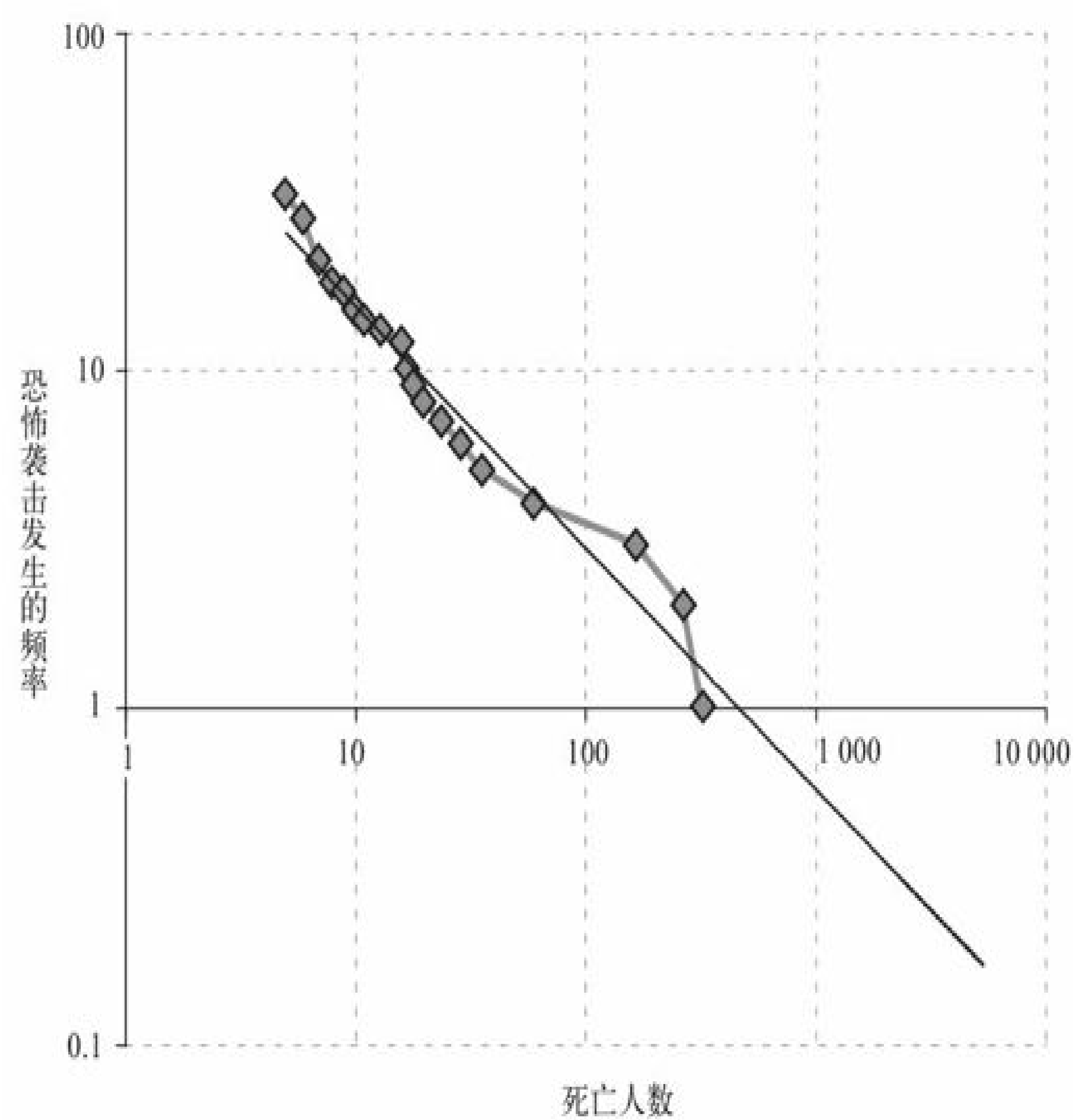


[illegible] 13-5 1979-2009 [illegible]

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[illegible]“[illegible]”[illegible] 3 700 [illegible] 600 [illegible] 2%[illegible]“[illegible]”[illegible]

[illegible]“9·11”[illegible]

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[illegible]·[illegible]·[illegible]24 [illegible]

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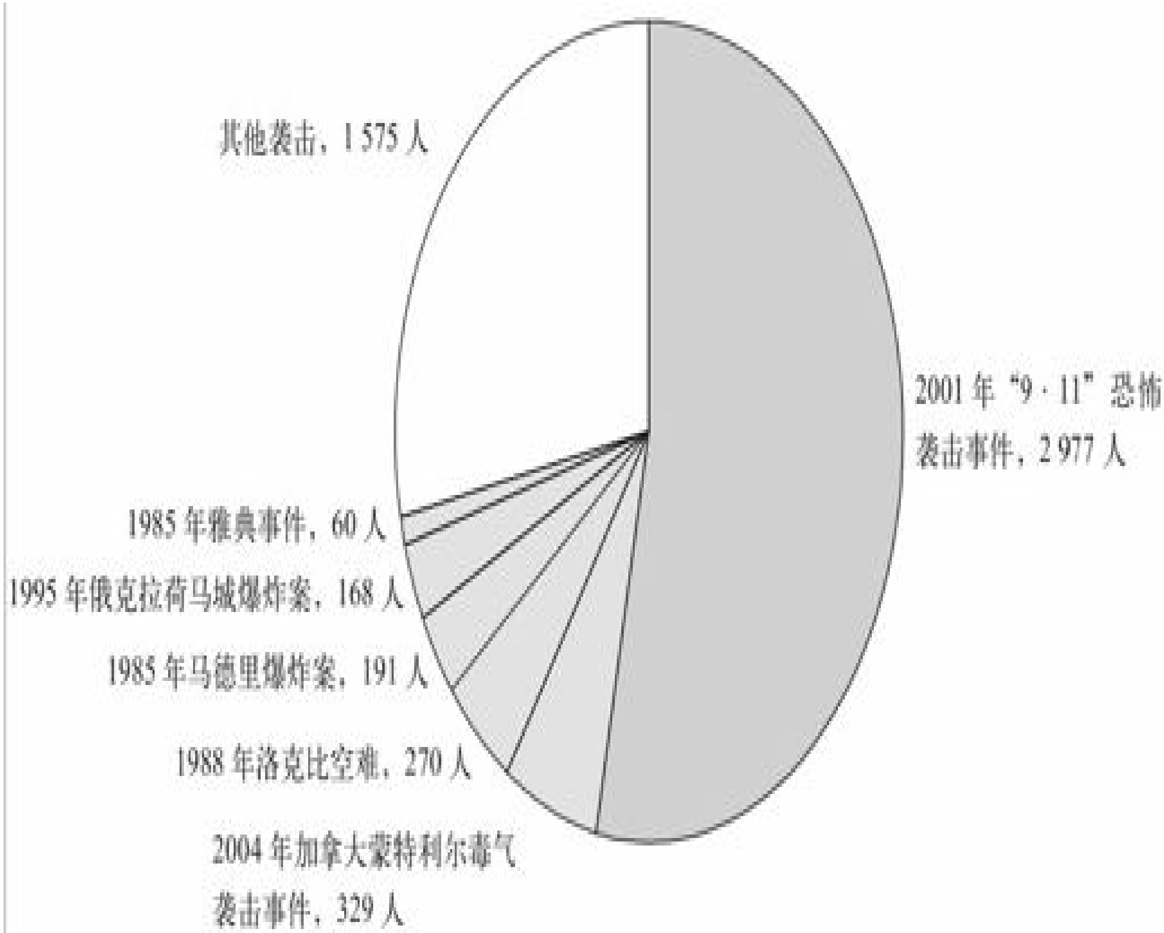
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13-7 1979-2009

[illegible]

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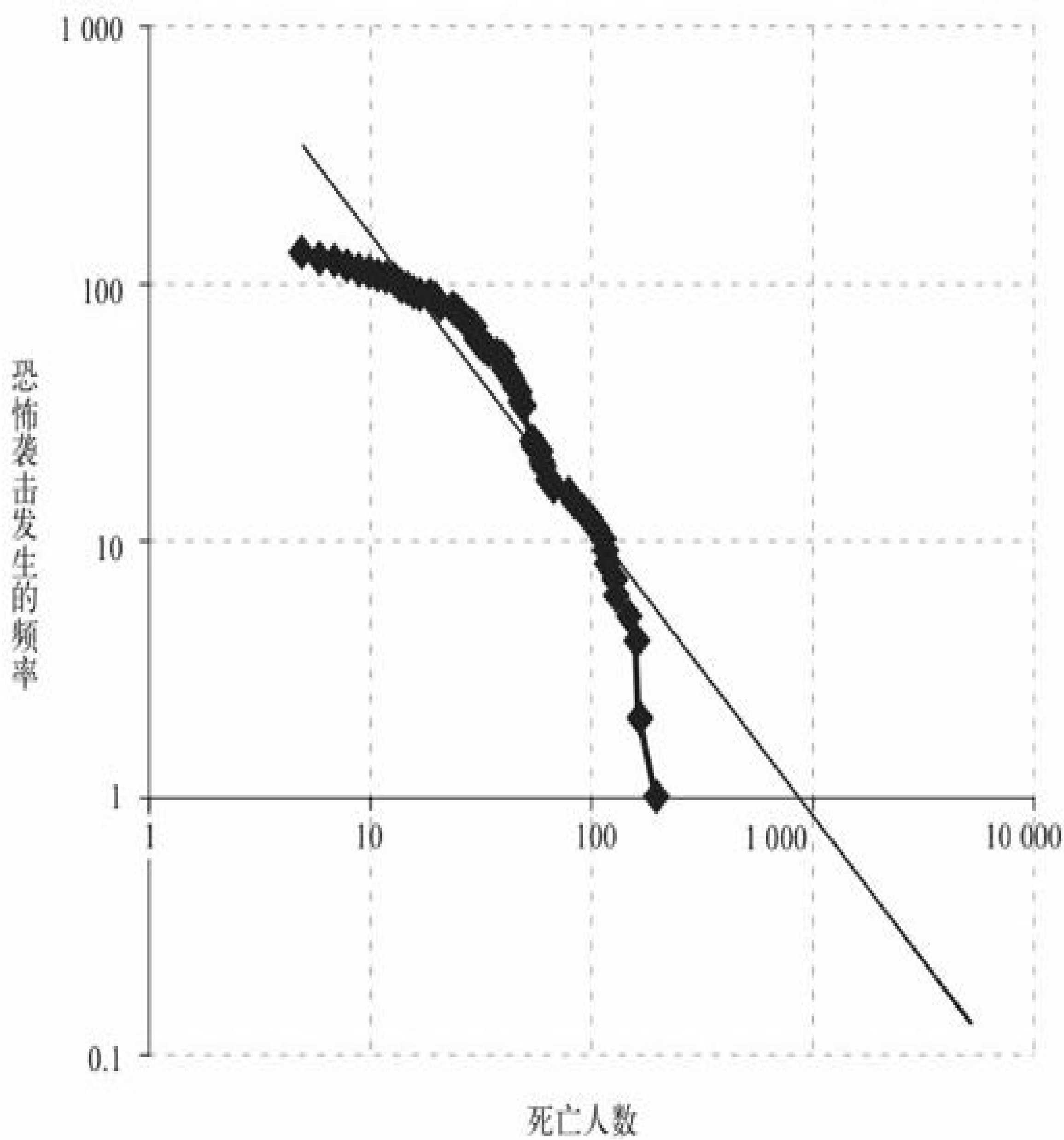
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[illegible]2012 [illegible] 16%[illegible]

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13-8 1979-2009

[illegible]·[illegible]——[illegible]“[illegible]”——[illegible]·[illegible]

[illegible]·[illegible]·[illegible]

[illegible]·[illegible]“[illegible]”[illegible]

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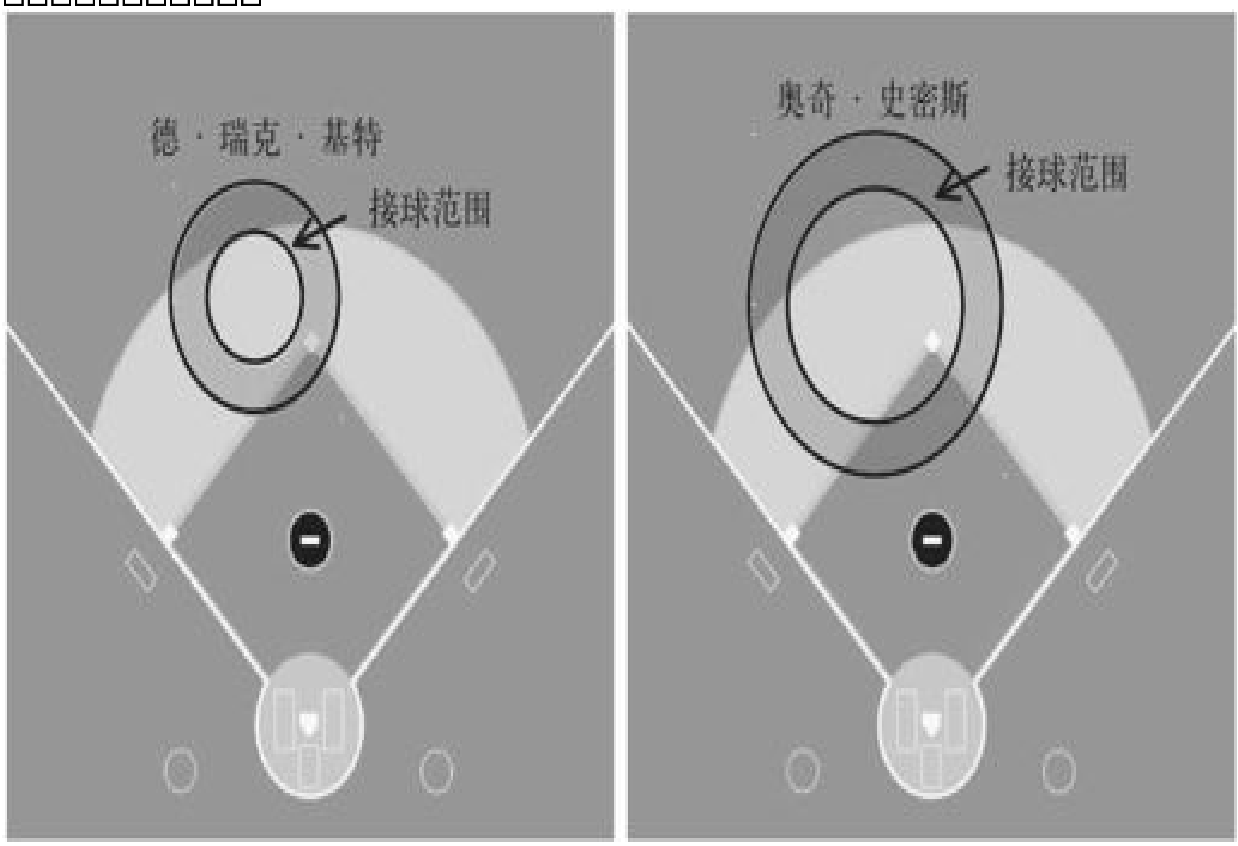
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[illegible]

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2.[illegible]

3.[illegible]

4.[illegible]

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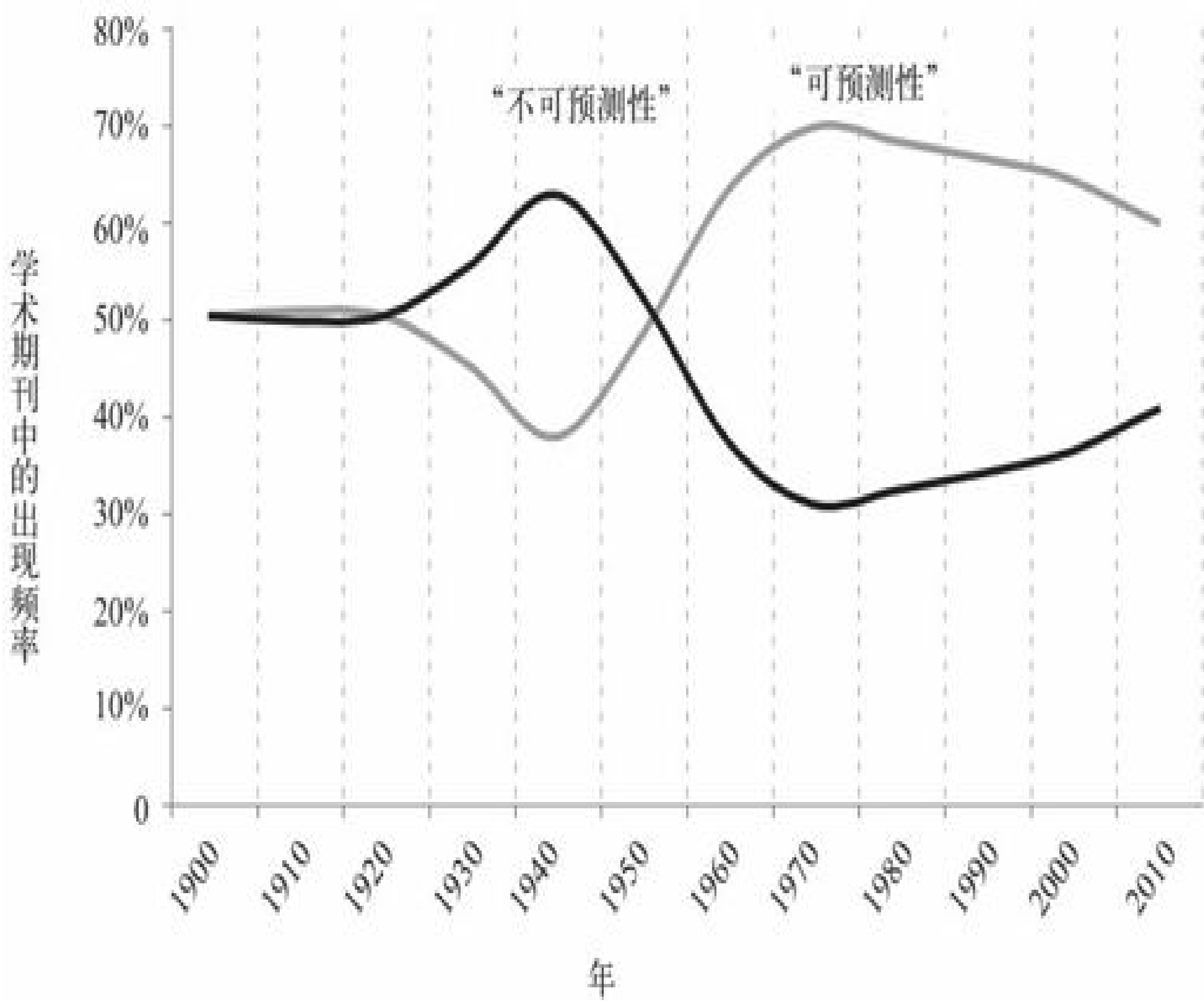
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[illegible]“[illegible]”[illegible]“[illegible]”[illegible] 2 [illegible]



[illegible] 2 1990-2012 [illegible]“[illegible]“[illegible]

[illegible] 12 [illegible]

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